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AMERICAN VOCATIONAL ASSOCIATION CONVENTION

On pages 389 and 392, the readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will find able descriptions of Grand Rapids, the convention city, where the American Vocational Association will meet this year on December 6 to 9.

This enterprising city of many industries has much to offer the visitor. The main attractions, of course, for the directors, supervisors, principals, and teachers, who will make Grand Rapids the Mecca of their pilgrimage, are the addresses and conferences that are listed in the official A.V.A. program for this year's convention.

Besides these professional offerings, there is another feature which is frequently overlooked, although it is of utmost importance, and that is the commercial exhibit which plays an important part in the program. From year to year, this exhibit is of prime importance to administrators and instructors alike in solving equipment and supply problems, for here they may view the latest in machinery, tools, and materials. Many of the machines are in operation, so that their proper manipulation also can be studied.

For advance notice of the A.V.A. program, read what the men, who are working tirelessly to make this convention a success, have to say in our Association News column on page 18A.

THIS MONTH'S COVER

The picture used for our cover this month shows great stacks of logs piled up at the end of the chute at Lolo National Forest, Montana. Photograph, courtesy of U. S. Forest Service.

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W-20 LATHE

You'll find this lathe to be quite different . . . and much superior to most machines of its type and capacity. For one thing, it is equipped with MULTISPEED Drive, that exclusive speed control which provides a stepless range of speeds from 800 to 4000 R.P.M. without changing a belt, shifting the motor, or stopping the machine. This feature alone has created a wide acceptance for the W-20 in the school field.

Further evidence of its superiority is the unusually large capacity of this lathe. The 14" swing over the entire length of the bed is definite evidence that this machine is really built for school use with nothing spared in its design or construction. If desired the W-20 Lathe can be furnished with as much as 49" between centers.

Furthermore, we believe we can safely say that no other lathe of its size is quite as attractive in appearance. Strikingly modern, its pleasing lines are in keeping with its advanced mechanical features.

Write for a completely new bulletin on the W-20 Lathe. There is no obligation.

Attend the A. V. A. Convention

Hotel Pantlind, Grand Rapids, Mich.

December 6, 7, 8 and 9

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This is the twelfth of a series of brief articles dealing with various woods, their properties and uses. It is our hope that they might make interesting and helpful classroom material. We will welcome your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

SHORT TALKS ON WOOD

SHAGBARK HICKORY *(Hicoria ovata)*

Best known of the many species of hickory found in North America, and the most important commercially. The wood is heavy, hard, tough, strong, elastic and close-grained. Heartwood is light brown; sapwood is white. Also called "Shellbark Hickory".

Used principally for agricultural implements, wagons, ladders, axe and tool handles, and sporting goods. The sweet tasting nut finds a ready market. One of the best fuel woods.

Shagbark Hickory is found from Quebec to Minnesota, south to Florida and Texas. Prefers a deep, rich, moist, loamy soil near streams and swamps or on low hills. Slow growing. Difficult to transplant.

A medium-sized tree, 40-70 feet high, with a slender trunk 1-2 feet in diameter. Has a tapering trunk free of branches for a considerable distance and a cylindrical head of relatively narrow spread. The tallest of the hickories. Its exceptionally hardy root system protects it against depletion from insects, fire, grazing and overcutting.

The bark is light gray on the trunk and separates into long, thick plates often a foot or more in length. These cling to the trunk by the middle, thus producing the characteristic shaggy appearance. The leaves are compound, alternate, 8 to 14 inches long, the leaflets ordinarily 5 in number, rarely 7. The fruit is borne singly or in pairs. Husk is thick and deeply grooved at the seams. The nut is much compressed, the shell thin, the kernel sweet and edible.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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Industrial Arts in Grand Rapids, Mich.

Arthur L. Reagh

Supervisor of Industrial Arts, Grand Rapids, Michigan

A well-drawn picture of the type of industrial-arts work which the convention city offers in grades 1 to 12.

The industrial arts have a long history in Grand Rapids beginning in 1900, under the old manual-training movement. The evolution through the various stages was guided until 1930 by the late L. R. Abbott, so well known in industrial-education circles. The present program is the modernized theory of industrial-arts education, built on the foundation so well prepared by him.

Grand Rapids is an industrial center, and as might be expected, the industrial-arts work is influenced by this fact. Community interests color all educational activities and the industrial arts in Grand Rapids is no exception. This city has been a woodworking center for many years, specializing in fine furniture. Naturally, general woodworking is very popular and a leading activity in the industrial-arts work. These shops are well equipped to provide the boys and girls with many opportunities to explore their abilities in this area.

The fields of graphic arts, metal, and others are also well represented. Since metal furniture has developed so rapidly in recent years, it is fast becoming as popular, if not more so, than wood, so metal courses have a very high place in the industrial arts in this city.

The elementary work, including the second through the sixth grades, is under the direction of Miss Vesta Shimel, Associate Supervisor of Art. The work in the Special Classes such as the oral deaf, the Braille, auxiliary and orthopedic junior and senior high schools, is under the direct supervision of the director of industrial arts. The setup provides opportunities for all children beginning in the second grade and ending in the twelfth grade. The expansion into the thirteenth and fourteenth grades is a possibility in the near future.

Elementary industrial arts represents phases of activity which give the child some understanding and appreciation of those things he must use and live with every day. It tries to make the child aware of his health needs and considers with him how the community is helping to meet these needs. As part of a food study, a sixth grade may visit a creamery, a bakery, and a cold-storage warehouse to see the care with which foods are handled and prepared for use. It attempts to make the child alert to the suitability, beauty, and utility of the products he uses, and tries, thus, to make the child a better consumer. A clothing study may include identification of commonly used clothing materials, current prices of yard goods, suggestions for cleaning and washing materials, and experience in mending.

Elementary industrial arts seeks to have the child retain a permanent interest in materials, processes, and products. Every child from the second through the sixth grade is given the opportunity to work with many materials. The purpose of this handwork is to help the child better understand some idea or process, to create an appreciation for fine workmanship, and to provide some knowledge and skill in a handicraft that may serve as an interesting hobby. So children are making pottery, shaping metals, carving wood, building things of wood, tooling leather, weaving, and decorating cloth. It would have the child understand, to some degree, conditions of industry. Trips are taken to industrial plants of the city to observe people at work, to clarify ideas, and to develop a greater appreciation for the products of industry.

All the work of this department is closely related to the social studies, science, health, and other experiences of the school day. Ideas and interests stimulated elsewhere develop objectively in these classes.

A workroom is provided in each school. It is equipped for work with wood, clay, leather, paper, metals, textiles, and foods. Obviously, some understanding of industries, which are fundamental in the organization of society, forms a large and significant part of the work.

The junior and senior program includes from the seventh through the twelfth grades, and is so organized that the work in the seventh and eighth grades is compulsory, and the courses given in the ninth through the twelfth grades are free electives.

Subjects taught in the industrial-arts department are: art metal, auto mechanics,

Printing — Ottawa Hills High School

Handcarving-Woodworking

Ottawa Hills High School

aviation, electricity, general metal, graphic arts, including bookbinding, home mechanics, mechanical and architectural drawing, and general woodworking. The Grand Rapids courses are organized under the unit-shop plan although the depression has been responsible for the development of a number of general shops in recent years.

The philosophy of the junior-high-school courses is exploration for self-guidance, and, therefore, a definite rotation is provided for the seventh and eighth grades, in order to give these young people as broad a view of industry and its processes as possible, the usual procedure is to give the 7–1 grade, printing, the 7–2, woodwork, the 8–1, mechanical drawing, and the 8–2, some one of the metal courses, such as general metal, elementary auto mechanics, or household mechanics, depending upon the physical equipment of the specific school. The reason for the variation of courses has evolved from additions and the development of new type shops in the newer high schools which were not possible in the older schools.

The students in the ninth through the twelfth grades elect courses, which they find make a contribution to their knowledge and experience, in the area in which they find their greatest interest and ability.

Anyone visiting the classes would be impressed with the high degree of vocational experience obtainable in the industrial-arts courses, and might think the general educational values are neglected or secondary, but this is not true. The boys and girls in this community get many opportunities to acquire related and supplementary information due to the community interests, and also from their parents who work in the various industries. This speeds up interest in the industrial arts, enabling the instructors to put greater stress on acquiring information and skill which will help the students in a vocational way. They realize the majority of their students will enter industry as workers. Those who anticipate becoming tradesmen usually enter the vocational schools after completing the eighth grade.

There are some interesting experiments being tried in the Grand Rapids schools, and the results warrant their mention here:

All industrial-arts instructors are familiar with the problem of the boy who wants to take all or as much shopwork as he will be allowed to take. Many of these boys should take a great deal of work in the industrial arts since they will not continue their education any further than the high school and will be benefited by experiences which will more fully prepare them to earn a living when they leave school. These boys rarely want to spend the required time in learning a trade but are interested in industrial work and often end up in responsible positions of a nontrade character.

In Grand Rapids, this problem has been helped by putting a few of these boys in each class to act as instructors' helpers in order to learn the foreman's duties. This is called "training for foremanship." These boys are a great help to the instructor and gain a wide experience by helping instruct beginners and taking care of maintenance, repairs, and many other duties which would fall to the lot of men in responsible positions in industry.

The industrial-arts department of Grand Rapids has accepted the responsibility of trying to make a contribution to the physically handicapped by giving courses for the blind, the deaf, the crippled, and the mentally retarded. The results from the courses given in nearly all of these cases have been successful enough to encourage further development of opportunities for these people. The handicaps of many in this group are so bad that one may wonder what can be done for them, and perhaps a few illustrations may help the understanding of this problem.

One of the hardest problems to overcome in most of these cases is to find a medium in which the crippled can work. Wood is always one of the most pliable, but more variety is desirable. The plastics and softer metals have filled this need in many cases. Printing has also been quite successful with orthopedic cases since hand composition and even presswork can be done when sitting on a stool.

One of the most interesting and successful cases is a boy who was a victim of infantile paralysis. He became very expert in hand carving and jewelry work. All this work was done while lying on his back in bed. The material was held in a special vise which had to be devised to hold his work. Today, he is helping to make his living by doing this work. His projects are in great demand as he is truly a great craftsman.

There are many human-interest stories cropping up all the time in working with the physically handicapped which makes the work very interesting, and the instructors feel that no effort is too great to do what they can for these less fortunate young people. Exhibits of such work will be on display during the American Vocational Association convention in Grand Rapids, December 6–9.

Grand Rapids has seven regularly organized junior high schools. Junior-high-school work also is given in the Eastern Avenue Orthopedic School and at the Blodgett Home for Children. Only two junior high schools, Burton and Harrison Park, are housed in their own buildings; the remain-

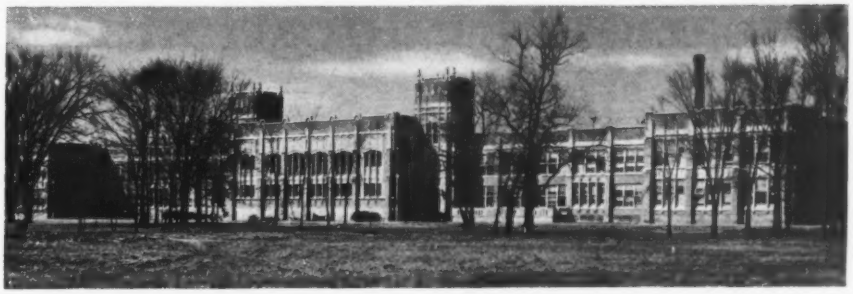
Airplane Model Building

der are in buildings with senior high schools. There are five combined junior and senior high schools.

All the high schools have fine shops, equipped with the necessary power and hand tools, to do the finest work. Pupils in the junior high schools are not allowed to use power tools until they have gained considerable skill in handwork.

The Harrison Park Junior High School has a very unusual organization, and one which should interest those in junior-high-school industrial-arts work. This school has two shops and a drawing laboratory. One shop is a general woodworking shop and the other is a general metal shop equipped to teach seven activities, including a machine-shop course. The organization provides facilities to teach sheet metal, electricity, forging, welding, plumbing, pattern-making, and general machine shop. Advanced students have made drawings, constructed patterns and machined the casting to complete such projects as bench drills, lathes, and other machines that are used in the shop. Exhibits of this work, on display, give evidences of a very high degree of ability for skilled craftwork by junior-high-school students.

The woodworking shops in all the high schools are of the general woodworking type. They are equipped to teach woodworking in all its phases; they contain power and hand tools suitable for teaching wood turning, carving, and patternmaking. The related information is adequately provided for in each shop by a shop library which contains many reference books and other material needed for this work. Provision is made in nearly all cases for a separate assembly room for class discussions and demonstrations. The casual observer might be highly critical of the ample equipment which provides for such a wide range of work, especially in the machine shops, for the presence of surface grinders and milling machines in industrial-arts shops may seem as though vocational aims are the first interest, but when one takes into consideration the complexity of modern industry and its rapid changes, he will realize that we must give a student much wider exploratory opportunity if he is to enter industry with even a very sketchy fund of knowledge to find his place and make adjustments in it.



Harrison Park Jr. High School

It is to be remembered that the boy working on the surface grinder learns of the changing trend of machine manufacture. He learns that there are nearly a hundred alloys of iron and steel which not only revolutionize industry but affect the social life of all industrial workers and their safety. These new metals need many new types of machines, so you will see a boy working on a miller and other machines, exploring his technical world. The boy on the forge is not doing the things that the old blacksmith of the past did. He not only learns up-to-date forging methods but also has impressed upon him the need for knowledge concerning all metals and their alloys, and their influence in speeding up production, resulting in a change in social living. The more technical the opportunities in the industrial-arts courses become, the greater the demand for the understanding of those participating in them. The development of the philosophy in Grand Rapids is evident when the equipment and courses are carefully examined. The instructors are busy preparing many displays of lessons, tests, and projects for exhibition to the A.V.A. members who come to Grand Rapids for the convention in December.

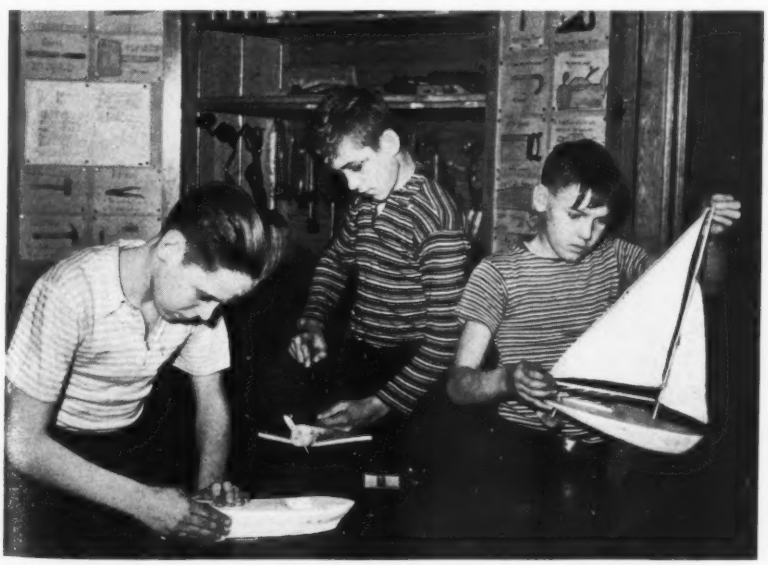
The work in the graphic arts is organized to give experience in all lines from composition and presswork to layout and design. The consumer values in these courses are very evident since the student learns appropriate printing needs for all lines of business by applying it to the various school activities. The various high schools produce all the needed printing matter for their school. They print their own textbooks for the printing courses including job sheets and tests. The various printing departments are busy preparing the programs, exhibits, and whatever will be needed for the coming A.V.A. convention.

The observer of many of these courses and particularly of the graphic arts, will realize the outstanding development of character-training due to the demands for accuracy, cleanliness, system, and order as well as safety.

The avocational interest is well taken care of in Grand Rapids industrial-arts courses, not only in clubwork sponsored by the department but through classwork given in the aviation classes and others which use model building as a means of motivating learning. The annual city-wide model-airplane contest, sponsored by this department, is very popular and the aviation classes and others produce many well-built models for competition in it.

The interest developed in these hobby clubs has had a surprising effect on the choice of lifework of the boys, and many of them, after finishing their high-school courses, have either taken up further study or entered the industry, where they have advanced to responsible positions. Hobby interest also will be featured in the industrial-arts exhibit at the A.V.A. convention.

It may be apparent that industrial arts in Grand Rapids is being developed along the lines of the most up-to-date thinking on the subject, and those in the department are experimenting with new possibilities for helping students of all conditions of life. Preparations are being made to entertain all A.V.A. members who come to the convention, and it is hoped many will avail themselves of this opportunity.



Elementary Industrial Arts

Vocational Education in Grand Rapids

George B. Frazee, Jr.

Director Vocational Education, Grand Rapids, Michigan

Vocational education as offered in the Convention City.

Vocational education was established in Grand Rapids in September, 1919, taking advantage of the provision of the Smith-Hughes law. Although it was on a small scale at the start, the growth has been constant. Beginning with an enrollment of 50 students, the George A. Davis Vocational and Technical High School now boasts of a student body of over 1,000 students.

The original class of 50 students was housed in two old residences and a garage. It soon outgrew these quarters, however, and it was necessary to put up a new building to care for the increased enrollment. The first part of the building was made large enough to accommodate 300 pupils. Two years later the school had an enrollment of 500 students and an addition was built to accommodate 750 students. As already stated, the present enrollment exceeds 1,000.

All courses come under the Smith-Hughes law, one half of the time being devoted to shopwork and the other half to related and academic subjects. The school has made an attempt to keep up with the changing conditions in the city of Grand Rapids by maintaining the utmost flexibility in courses, content material and equipment so as to take care of local industrial changes.

At the present time we are offering courses in furniture design, rod making, furniture machine and cabinetwork, furniture decorating and finishing, auto repairing, machine-shop practice, electricity, printing, wood and metal patternmaking, architectural drafting, machine design, and commercial art for boys. The girls are offered a thorough course in home economics. One of the features of our home-economics work is a model housekeeping apartment, located on the third floor of the school. This apartment is unique in the fact that all furniture was designed and built by the students. The dining-room suite is strictly Duncan Phyfe and is worth approximately $2,500. It is hand carved, match veneered and inlaid. The foods work is taught on the unit plan, four girls to a unit.

Another interesting feature about the equipment of this school is that school desks are not used in classrooms. Tables and chairs were especially designed and built by the students of the furniture-craft department. The classes in which furniture and machine design is taught are equipped with especially designed drawing tables made by the students in the school. The office furniture, paintings, etc., in the principal's office also are the work of the students at the school.

Music is offered at Davis Tech on the same basis as any other trade, students devoting half of their time to music. The school has three bands, and two choirs, in addition to smaller groups of instrumentalists and vocalists.

The vocational-school guidance department is organized with a director of vocational guidance who has developed a guidance program carried on by the class advisers. These class advisers, one man and one woman for each class, are appointed for every freshman class as they enter and they continue with that class through the four years. The guidance director keeps in close touch with the principals of the school, and with the class advisers. This system of counseling has worked very effectively.

The Grand Rapids public-school system is one of the few in the United States that maintains its own placement and foremanship department. This department was started in September, 1919, by the University of Michigan. They continued the courses for two years as extension courses from that institution. In 1921 the foremanship department was turned over to the Vocational School. The director of foremanship conducts classes either on company time in the plants, or at the school building after working hours, suiting the convenience of the special trade or industry. The placement department was started in September, 1921, as a special feature of the Vocational School, but the demand became so great from the other high schools that it was extended to accommodate the graduates of all high schools and is now known as the City Schools Employment Department.

Apprenticeship is being organized in Grand Rapids through the board of education by Edward Kosten, co-ordinator. From the progress made, it looks as though this system will be very successful.

Commercial education is a distinct part of all high-school courses. The course at Davis Tech is on a very practical basis. The teachers are not only graduated in academic subjects but have had years of practical experience in shorthand, typewriting, office machines, filing, bookkeeping, and commercial law. These courses are also very popular with postgraduate students. The equipment as laid out in the commercial department at Davis Tech was recommended by the office managers of the city of Grand Rapids.

Creating Community Interest for Vocational Courses

Waldo L. Adams

Superintendent of Schools, Sturgis, Michigan

A method of getting the community and the school to cooperate in giving youth a real start in life.

The depression has definitely shown the vital necessity for proper community understanding of the public schools. How to create this interest and understanding is not an easy problem. This article contains an account of the plan used to create understanding and interest in the vocational-school program of the Sturgis public schools.

The underlying purpose of this project was to show that the business life of this community is closely connected with the vocational courses in the Sturgis public schools. The business interests pay the majority of the school tax. They also employ most of the persons from the four vocational departments — commercial, shop, home economics, and agriculture.

Creating Interest

Several means were used to create interest in the project. The local Chamber of Commerce and the Rotary Club were approached for cooperation which was freely given with the result that many of their members attended the open-house exercises and assisted with the employment surveys made.

An evening date was chosen at which time the advanced students in the various departments carried on their vocational ac-

tivities under the scrutiny of the visitors. The date was chosen during the last semester of the school.

A part of the project involved the making of a study in each vocational field which would show the extent to which each vocation was followed by people in the community. Copies of these studies were given to the visitors who attended the various classes.

A fourth means of creating interest was a series of newspaper articles which appeared every day for a week preceding the open-house demonstration. Thirty-eight column inches of newspaper space was devoted to this publicity, which contained much of the data revealed by the surveys of employment being made by the several classes.

In addition to the newspaper publicity, personal letters were written to the various firms by the superintendent of schools asking for the presence of their executives and employing officials. Suggestions for the improvement of the courses of study were encouraged from these representatives.

The Studies

A total of seven studies were made by the four departments of the school. Reports were secured from 103 firms who were employing 1,587 persons. This number is 72 per cent of those in Sturgis who make returns to the U. S. Government for social-security purposes. No doubt the 2,200 returns made also included 85 per cent of those employees who live in Sturgis. The validity of the studies as a guide to curriculum planning is therefore very great.

The typewriting group made a study of the work of 311 office workers to determine what percentage of the total performed various types of work and in what combinations if more than one type of work was done. The bookkeeping group made a study covering the business forms used by 25 retail merchants in the city of Sturgis. The shop students made a study of 232 metalworkers and 463 woodworkers to determine what types of work these workers were doing. The home-economics department made a study of 24 retail merchants to determine what aspects of their courses were of greatest value to their 73 employees. The mechanical-drawing class made a study of 228 persons who needed mechanical-drawing knowledge in their work and to determine what their needs were. The agriculture class made a survey of 26 farms whose students attended our high school to determine what kinds of farm implements were needed.

Conducting a Clinic

The visiting employers and executives at the open house were assembled, and the superintendent of schools explained to them that they were to assist in a clinic which was:

a) To help business firms to realize the school's interest in helping their prospective employees before employment begins.

b) To help the school fit the work more closely to what industry requires of its employees.

c) To offer a chance for employing officials to see prospective employees at work before they make application for a position.

d) To assist students to find employment for which they have had some definite vocational training.

e) To help the school and employers to realize that each can be mutually helpful to the other.

The clinics were divided into two periods. The work of the first period was repeated during the second, so that each firm's representatives had an opportunity to visit two classes. In each class stenographers were present who took down the suggestions which the visitors had to offer. Three fourths of each class period was devoted to a demonstration and the remaining one fourth was given over to questions, answers, and suggestions. Guides directed those who wished to visit a different class at the end of the period. Only 25 per cent of the visitors changed classes. Most of them preferred to stay twice through the same demonstration and discussion. Each visitor upon entering a classroom was given a copy of the survey of industry made by the members of that class. These studies are reported under "Results of the Studies of Employment in Sturgis." Each visitor was also given a copy of the course of study which is followed in the class under observation.

Result of the Studies of Employment in Sturgis

Office Employment: The office-employment study was made by the advanced shorthand class. This study revealed that there were 311 office workers employed in Sturgis. The type of work done by these office workers, at the time of the survey, is revealed in Table I. This table reveals that 123 of these people are typists, 50 are stenographers, 60 are bookkeepers, 33 are filing clerks, and 45 are retail sales clerks.

TABLE I. Survey of 311 office workers in Sturgis

Type of Work	*Number*	*Percentage of Total*
Typing	123	40
Stenography	50	16
Filing	33	11
Bookkeepers	60	19
Retail sales clerks	45	14
No. of Sturgis High School graduates without additional commercial training	95	36
No. of Sturgis High School graduates with additional commercial training	50	16
Others	166	18

Table I indicates that 95 persons or 36 per cent are graduates of the Sturgis High School, and have not taken additional training. It is thus evident that it is possible for Sturgis High School to prepare people definitely for office employment without their taking additional training. This has been done in courses none of which are longer than two school years.

Business Forms: The advanced bookkeeping class made a survey of the extent to which 25 local business concerns use various business forms. This information is revealed in Table II.

TABLE II. Survey of business forms used by 25 Sturgis retail merchants

Business Forms	*Number*	*Percentage of Total*
Cash book	23	92
General ledger	18	72
Ledger	16	60
Purchase journal	14	56
Sales journal	13	54

It is interesting to note that five business forms are used by the majority of these retail merchants. The cash book, of course, is the most common business form, followed closely by the general ledger. It is surprising however to note that approximately one half of the 25 do not keep purchase journals or sales journals.

Metalworkers: The advanced shop class made two studies, one concerning metalworkers and the other woodworkers. The data for metalworkers are shown in Table III which reveals that there are 232 metalworkers in the city of Sturgis. Of this number approximately one third are workers in sheet metal. Finishing activities, which include grinding, buffing, and polishing occupy the full time of approximately one fourth of all metalworkers, lathe operators form 17 per cent of the total, and drill-press operators form 12 per cent of the total.

TABLE III. Shop survey covering the work of 232 metalworkers

Type of Work	*Number*	*Percentage of Total*
Drill press	31	12.9
Lathe	40	17.2
Grinding, buffing, polishing	53	22.8
Tool making	7	3.5
Shaping	3	1.3
Sheet metal	76	32.8
Plumbing	22	9.5

Woodworkers: The data for the second study made by the advanced shop students are shown in Table IV.

TABLE IV. Survey of work done by 463 Sturgis woodworkers

Type of Work	*Number*	*Percentage of Total*
Jointer operators	16	3.5
Drill pressman	11	2.4
Latheman	4	.9
Circular-saw operators	14	3.0
Shaper operators	11	2.4
Cabinetmakers	55	11.9
Finishers	177	38.2
Glueing	38	8.2
Upholsterers	26	5.6
Sanders	50	10.8
Carpenters	40	8.6
Tailing machines	21	4.5

This table indicates that there are a total of 463 men employed in various types of woodwork. Of this number 37 per cent spend all their time in finishing activities. Twelve per cent are cabinetmakers and 11 per cent do sanding. Wood lathe operators

are less than 1 per cent of the total number of workers. It is surprising again to note that finishing operators which included sanding operators as well, include nearly one half of all the woodworkers. This is a greater percentage for this activity than for the same activities in the metal trades.

Retailers: The home-economics department interviewed 24 retail business concerns. The firms studied employ a total of 73 people. The proprietors were interviewed by the girls of the home-economics department to find which of the 11 points in the courses of study in the high school should receive the most emphasis. These data are shown in Table V.

TABLE V. Survey of 24 retail business concerns

Type	*Number of Firms*	*Percentage of Total*
Art principles	13	56
Buying	12	50
Sanitation	11	48
Textiles	8	34
Child care	7	30
Cosmetics	7	30
Foods	7	30
House decoration	6	26
Dressmaking	5	20
Sewing	5	20
Care of clothing	4	16

Table V reveals that 56 per cent of these firms felt that a knowledge of selling principles was very important. Fifty per cent of them felt that a knowledge of buying was important. Since a number of these places were engaged in food preparation, it is clear why 48 per cent of them felt that a knowledge of sanitation was very important. Each of the other 8 points of emphasis in the course of study were thought important by one third of the other business concerns.

Mechanical Drawing: The mechanical-drawing department made a study to determine the number of persons who use mechanical-drawing information and to learn what aspect of mechanical drawing seems to be the most necessary. This data is reported in Table VI which shows that 228 persons

TABLE VI. Survey of the work of 228 persons who use mechanical drawing

Type of Use	*Number*	*Percentage of Total*
Reading knowledge only	137	60.1
Mechanics	34	14.9
Tool and diemakers	31	13.6
Part-time draftsmen	13	5.7
Full-time draftsmen	12	4.8
Designers	2	.9

are employed in Sturgis who make use of mechanical drawing. Sixty per cent of these persons need to have only a reading knowledge. Mechanics, tool and diemakers who comprise 28½ per cent of the total, need to have a more extended knowledge of the subject. It is very interesting to note that there are 25 people in Sturgis who are engaged in either full- or part-time work, as draftsmen.

Rural: This survey was made by the vocational agriculture class. The object of this study was to indicate to some degree the needs of 26 farms surrounding Sturgis. While only 24 farms were surveyed, they were considered to be representative ones for the Sturgis agricultural area. The data gathered are shown in Table VII. The conclusion that may be reached by a study of this table is that surrounding farms are a tremendous potential market for manufactured goods of all types. If electricity were available, this demand would be even greater. This class study was the means of showing that retail business, industry, and the farmer were mutually dependent.

TABLE VII. Survey of the needs of 26 farms in the Sturgis community

Needs	*Number*	*Percentage of Total*
Cement	9	35
Lumber	12	46
Roofing	12	46
Windows	10	39
Paint	18	69
Hardware	11	42
New buildings	15	58
Furniture	10	39
Radio	4	15
Rugs	9	35
Dishes	3	12
Wallpaper	11	42
Furnace	8	31
Kitchen utensils	7	27
Curtains and draperies	7	27
Fencing	16	62
Wagons	22	83
Hay loaders	21	80
Heavy truck and accessories	23	87
Side delivery rakes	19	75
Dump rake	11	42
Mowers	23	87
Binders	21	80
Corn harvesters	6	21
Manure spreaders	20	80
Riding plows	17	67
Walking plows	24	91
Harrows	23	90
Cultipackers	17	67
Rollers	6	21
Disk	8	29
Corn cultivators	25	96
Grain drill	21	80
Corn planter	22	83
Potato planter	1	4
Potato digger	9	33
Gas engine	11	42
Pump jack	12	45
Windmill	19	75
Cream separator	21	80
Running water in house	16	62
Running water in barn	18	73
Inside toilet	22	85
Bathroom	20	77
Electricity	11	42
Tractor	21	80
Fire insurance	4	15
Life insurance	4	15
Commercial fertilizer	18	69

Conclusions of the Clinic

1. Businessmen expressed themselves as very much in favor of this type of school and community cooperation. Without exception everyone hoped that this type of clinic might be made an annual affair.

2. Employers were much pleased with the opportunity to see students at work. As a result of this opportunity, large numbers of students were placed on a preferred list, for employment. As a result of this clinic all the students in the shorthand and typing department began work in industry at the end of the school year.

3. Employers are looking more and more to the high school to supply them with their future workers. It is apparent that the school needs a master list of students who have received definite vocational training so that the school might serve industry to a greater extent.

4. The school received a large number of valuable suggestions which can be incorporated into its courses of study.

5. Retail business and industry were surprised to learn that the school appreciates their paying heavy school taxes. The consideration that the clinic gave to the businessmen made them feel that the school was very definitely tied into the economic welfare of the entire community.

6. The surveys were of value to the school in showing relative importance of various activities as well as giving for the first time to the businessmen some knowledge of how their workers form a part of the entire community.

7. The board of education was very much impressed with the helpful and interested attitude of the businessmen toward the school.

8. The success of this vocational clinic suggests that value might accrue to other departments of the school if similar clinics along their line were held. Such clinics are now being planned for the music, art, and literary departments of the school.

Furniture design and modeling department.
George A. Davis Vocational and Technical High School, Grand Rapids, Mich.

Publicity for Evening Trade Extension Classes

Edgar J. Spady

Director Industrial Education, Richmond, Indiana

A helpful, well-thought-out plan for securing the needed publicity for evening school.

Publicity, as here used, is any activity which informs groups or individuals of the functions and opportunities of the evening trade extension program.

The purpose of publicity is to accurately and interestingly inform the community of what the trade extension division has to offer in self-improvement instruction, and to encourage individuals and groups to draw on the resources of the public schools for any special instructional helps which may be desired. Good publicity does much more than announce which courses are offered. It reports the progress of outstanding students, builds good will, suggests possibilities of self-improvement to employed persons, does missionary work among those uninterested in industrial education, and serves as a constant reporter to the public which is the owner.

Adequate publicity is essential to the success of any program. In fact, without it no program is possible. To inform interested groups and the general public of what is going on in the evening trade extension classes there should be a planned and continuous program of publicity. Too many publicity programs are merely a series of patches. Casual news items, announcements, and general notices are released from time to time but, usually, there is little if any connection or relationship between the various releases. Effective publicity uses the rifle rather than the blunderbuss technique.

Publicity Mediums

There are many publicity mediums. Some of the best known are newspapers, paid advertisements, articles for house organs or magazines, motion pictures, photographs, radio, speeches, reports, posters, and conventions. Among the not so well known, but most effective, are contacts with employment managers, business agents of local unions, contacts with former students, foremen, the local office of the state employment service, and general letters from plant superintendents recommending that their employees take certain courses. The wage and hour law administrator has ruled that an employer need not pay for evening-school time if attendance is voluntary.

Newspapers are frequently used to disseminate information about extension classes, hence a brief statement concerning writing for newspapers is included.

Seek to establish cordial press relations. The average editor in a small city is usually an ordinary human being and is quite approachable. Meet him. Tell him about publicity. If you have a publicity committee have the local editor serve on it. In larger cities editors are not so easily approached, but good press relations can be established in the largest city. If you do nothing more than keep the press "off your back" the time spent in developing good press relations is well worth the effort.

The News Story

Now as to writing your story. Make it *news*. Make it brief, clear, and factual. Omit verbiage. Condense your story to two or three paragraphs. Be on the alert for dramatic incidents which can be turned into publicity. Play up the unusual classes. Release stories about students who travel unusually long distances to school. Note unusual achievements of students. Publish lists of evening-school enrollees. Publish photographs of individuals and groups when possible. Father and son in the same class is often a good publicity item.

Small newspapers like to publish names and photographs. News of this kind sells papers.

Pay particular attention to the lead or opening sentence of your news article. The introduction should carry the news of the story. Everything after the introduction is an elaboration of the introduction. An editor or a rewrite man can, if necessary, begin at the end of a well-written news story and slice off, sentence by sentence, enough words to make the story fit the available space without detracting from the news value of the story.

You may be able to write perfect news stories, and your press relations may be of the best, but if you depend on newspapers alone your publicity program will fail. Many people do not read the newspapers. Others merely skim the headlines, hence miss much of the news.

A brief radio announcement, if you have a local station in your city, during the news period is good publicity. This announcement should be made by the regular news announcer, but should be prepared in advance by the local director of vocational education.

Posters which merely announce the names of courses are of but slight value as publicity. However, posters which have clever illustrations and carry interesting news items can be used effectively to keep a special group informed of what is going on. They may be displayed on plant bulletin boards, in union clubrooms, and at any other place where interested groups assemble.

It is often helpful to "paper the town" with mimeographed notices or handbills. These notices should carry the name of each course, a three- or four-line description of each course, and the name of the instructor. In writing the description of these courses try to give the ordinary layman an idea of what the course is about. These mimeographed notices are best sent home by the pupils of the elementary grades. Generally speaking, junior- and senior-high-school pupils are much too grown up to take home a notice of this kind. These notices may have a blank at the bottom where parents and older brothers can indicate their choice of course and then return the blank by the children the next day.

Postal cards to those who were enrolled during the previous year are often productive of results. This postal card not only gets students but also builds good will. People like to know that they have not been forgotten.

Employer and Employee Groups

One of the best ways of getting publicity across to a group of employees is to call on the management of the local plants and tell them about your program. If the management is sold on additional training for its men, you can usually get considerable help in putting over your program. Management can help by issuing signed bulletins which encourage attendance, pay-envelope enclosures, news items in the house organ, prizes or awards for attendance, and in other ways. The superintendent of one large plant writes a personal letter of commendation to each one of his men who receives an evening-school certificate. In many cases the letter of commendation has been prized above the evening-school certificate. When the management is sold on trade extension classes it is easy to get the employment manager to assist in making a survey of training needs in his plant, and thereby help you determine which courses you should offer.

The business agent or president of a trade-union is as effective a source of publicity in the union as the management is in a plant. A good business agent usually has the interest of his members at heart. No one realizes better than he the need for highly skilled men if his union is to survive and be respected by the community. It is not unusual for trade-unions to request certain extension classes. When this happens see that they get good service. Usually they are most cooperative. They will help keep up attendance and frequently can furnish the membership for a whole class. Not only is a trade-union a good booster

for the program, but it is also a powerful friend in time of trouble. Don't wait until you are in difficulty before making friends with your local union representatives.

The individual foremen or a foremen's club is frequently excellent publicity. The conscientious, hard-working foreman has the interest of his men at heart. He is interested in having the most competent men available to work for him. He can be depended on to talk to his younger men and counsel them regarding their preparation for more responsible work. The live foreman will help you if he is convinced that you have something to offer. He cannot be satisfied with talk and vague generalities about the value of training.

The advisory committee, whether it be general advisory or trade advisory, is an excellent publicity aid. The members of your advisory committee, if properly selected, have contacts which are invaluable. The committee members can frequently put in a word for the extension program with their personnel department or employee's association.

Personal Contacts

Do not overlook personal contacts as a publicity medium. Frequently a plant superintendent, business agent, or personnel man has certain unformulated ideas regarding a training program, but has not made definite plans. In a case of this kind your personal contact may be the starter necessary to get a sizable program going. This is an especially good way of getting enrollment volume, and volume is the success yardstick used by most state departments. A handbill sent home by a pupil may get a student or two. A successful personal contact may enroll several classes. In the beginning the manufacturers and labor unions do not know you or your program. In some cases it may take a year or more to convince them that a training program will be of value. However, the fellow who is hardest to convince is apt to be your best customer once he is sold.

An almost untouched field of publicity is your local office of the state employment service. This agency is usually most willing to help. It knows in which fields training is needed, and can usually refer many students to your classes if you have, or will arrange to have, the proper classes. In some instances, the employment service will recruit the entire class.

If you decide to prepare a report for publicity purposes, use plenty of pictures and graphs. The pictorial graph which uses figures of men, women, and objects to tell its story is particularly effective. The lay public will not read printed matter, so keep your written explanation to a minimum. A good report is frequently excellent publicity. The main objection to this type of publicity is its cost.

Local service clubs, women's clubs, and various trade associations are usually looking for speakers. This is an opportunity which should be accepted. The more people who know your story and what your program is the better are your chances for a well-publicized program. The main objection to this type of publicity is that it is not personal enough. People are prone to treat it as a general talk, not specifically applicable to them.

A well-run convention of your state industrial education association is an effective means of centering the attention of the general public of your city on your whole program of industrial education. The entire business community is usually most willing to help you make your convention a success.

Does Guidance Concern Teacher Education?

Lawrence F. Ashley

Chief, Division of Vocational Education, Board of Education, Yonkers, New York

An exceedingly thoughtful discussion and pronouncement on this important subject.

It has taken but three decades of twentieth-century evolution to cause the *character* of a population largely rural to become largely urban. Vastly improved means of communication, transportation, improved home conditions, the radio, talking pictures, and an exodus to the cities are back of the change. State laws have raised the school-leaving age and child labor laws have deferred the employment of young people.

Educationally, urban advantages have induced children to remain two or more years longer in school than formerly, and where the per cent of graduates from high school had been 10, in some instances it jumped to 50, with an increasingly larger percentage now entering and graduating from college.

Thirty years ago, if one went to college, he had such a definite purpose in mind, there was little or no need for orientation for it was a great event in the life of one so fortunate. Parents and children alike weighed objectives of colleges and methods of matriculation in advance of entrance dates so that the order of procedure could be well understood. Today, thousands of young men and women enter high school and graduate because it is the natural step after the eighth grade or because they have not yet reached the legal school-leaving age. Many will enter college because it too has come to be the conventional next move. That is about all the explanation they can give. What it is all about is of little or no concern. What are they going to do in college? Should not this question be as vital to society as is the problem of guidance on the junior-high-school level where its importance is already established? What has been done to date and what are the possibilities for teacher education?

The College Student in Early Developments

Organized guidance had its beginnings in Europe, primarily France and Germany, in connection with trade organizations and authorities in charge of industrial education. The period 1904–08 established the movement in Great Britain. Parliament passed acts at that time permitting school and trade authorities to spend public funds for the maintenance of "Vocation Bureaus, or Juvenile Information and Employment Bureaus." The movement was launched in America by an address of Frank Parsons before an economic group in Boston in 1908. This resulted in an invitation to speak at the graduation of an evening high school on the choice of a vocation. Meyer Bloomfield's enthusiasm relative to the possibilities for guidance led to the establishment of the Vocational Bureau and Breadwinners Institute where college students, high-school students, and young businessmen called for advice. A national conference on guidance was held in Boston in 1910 and a second national conference was held in New York in 1912.[1] Lewis writes of the rapid spread of the movement's popularity as follows:[2]

> The local newspapers of more than forty towns and cities located in some sixteen states discussed various aspects of vocational guidance during the six months from December 1911 to May 1912.

College courses in guidance were first offered in the Harvard University Summer School in 1911. Similar courses followed in Indiana University in 1913; the State Normal School at Greeley, Colo., in 1913; Boston University, 1913; the University of California in 1914; and Teachers College, Columbia University, in 1916.[3] All courses,

[1] Bennett, Charles A., *History of Manual and Industrial Education 1870 to 1917* (Peoria: The Manual Arts Press, 1937), 566 pp.

[2] Lewis, Ervin E., *Vocational Guidance*, Eastern Illinois State Normal School, Bulletin Number 38, 1912.

[3] See Brewer, John M., *The Vocational Guidance Movement*.

while preparing counselors for guidance service in the public schools, had to do with the orientation of children in industrial life. Beginning about 1925, such work came to be an accepted part of programs in large city junior high schools. Small school systems have been unable until recently to provide a budget for guidance. An alternative has been to have the regular classroom teacher give occupational information in connection with her subject so far as she is able to do so.

Efforts of Colleges to Disseminate Information

Schools of higher education have issued printed matter, catalogs, bulletins, and other descriptive matter about their institutions and courses. These have been little more than directions for the routine of registering or matriculating. They have also listed courses required for certain degrees together with brief hints as to what might be expected in them. Overcrowding of certain courses due to teacher personality and hearsay evidence about them have made colleges aware of a need to have students understand better what they are about.

The Illinois Schoolmasters Club meeting in Peoria in October, 1926, had under discussion the topic, "The Training of Teachers."[4] A point was made that the teacher profession of the state would profit from a closer cooperation between the teacher-training institutions of the state and the administrative officers in charge of the public schools. One form of cooperation had to do with the selection of prospective teachers from the student bodies of the secondary schools. The opinion was expressed that this selection at the present time is not always wisely made.

As a result of the discussion at the Peoria meeting and subsequent meetings a pamphlet was prepared to be placed in the hands of public-school superintendents and principals with the expectation that they would bring it to the attention of their teachers and high-school students. The booklet attempted to present in brief form the demand for teachers in the state, the trend of salaries, promotion possibilities to those who remain in the profession, provision which the state has made for the training of teachers, and some results that have been made relative to the characteristics of successful teachers and the more common causes for the failure of teachers. The bulletin takes the position that teaching as a profession is steadily becoming more stable, more respected, and consequently more attractive. Success in the work of teaching demands certain personality traits, certain attitudes, and definite training. It was the stated purpose of the pamphlet that it would direct to the profession "those who may wisely enter it and help others decide that success for them lies in other fields of service."

The five state teachers colleges cooperated in distributing the pamphlet. The result in each of the institutions was an increase in enrollment, which may or may not have been anticipated, and a heightening of interest in an orientation program.

Koos and Kefauver[5] present considerable data relative to guidance activities of the junior colleges. They found fifty-two junior colleges using seven kinds of publications for the purpose of informing students. Printed programs of study were used by 80.8 per cent of these colleges; 73.1 per cent had special catalogs in more detail; 67.3 per cent had additional information on university requirements; 13.5 per cent had special circulars on university requirements; 80.8 per cent had a collection of college and university catalogs; 19.2 per cent ran guidance features in junior college papers; 5.8 per cent had reading lists on occupations.[6] These schools made varying attempts to securing student information relative to home background, educational plans, etc., in accord with methods used in the secondary school. Something like 50 per cent of the schools were attempting to learn something about entering students by means of tests and measurements of various kinds.

Guidance responsibilities in the fifty-two junior colleges were found to rest with six different functionaries,[7] the administrative head, dean of women, dean of men, advisers, counselors, and guidance committees. Most colleges used the dean of men and the dean of women as the guidance functionaries.

In spite of the various functionaries and the attempts under way to adjust students properly to the college setting, too often the young man or woman "just starts" on hearsay information that certain courses are more interesting, require less work than others, or the teacher is more approachable, or an acquaintance recommends a certain course, and the like. The fault may lie in the fact that there are not enough unbiased people in charge of orientation and guidance at the college. Where it is conceded in secondary education, there should be a counselor for every five hundred students; one finds too often a single college dean to whom students may go. True they may call on department heads, but the grand scramble for enrollments is likely to have made the department head a salesman rather than a prophet.

Criteria for Guidance in College

Desirable guidance for college beginners would presumably help them to know the purpose of the college, what curriculums are offered and to what they lead. If the student can really be interested in any of the curriculums, he should be given help in signing up for the right ones, those which may lead to an interesting goal for him. Elliott, nine years ago, in the Ohio Guidance Manual Number 1, gave these general objectives for Educational Guidance:[8]

1. Choosing attendance or non-attendance.
2. Selecting a course, curriculum or school.
3. Selecting electives as well as a required program.
4. Determining the worth of the course, subject curriculum or school.
5. Determining the goal or purpose of the course, subject, curriculum or school.
6. Considering changes in courses, subjects, curriculums or schools.
7. Determining sequences.
8. Determining what to do about failures.
9. Considering leaving school.
10. Meeting specific curriculum requirements.
11. Transferring from one course to another.
12. Considering attendance upon higher schools.
13. Making selection of schools, curriculums and courses for higher work.
14. Seeking practical activities that enliven curriculums and courses.

Weighing the Elliott Criteria

How do the foregoing objectives function for the beginning freshman in college?

No. 1. It is obvious the student must decide to go or not to go. The place of the college in helping the student with this decision is in sending him such literature and catalogs as will convey plainly the truth about the college and its offerings. The writer had the task of examining sixty-four college catalogs and reporting on their contents as relating to courses leading to the bachelor's degree. This proved to be one of the most difficult tasks he had ever undertaken because information was often misleading and indefinite. It was seen that the college catalogs were faulty for the most part in failing to convey clearly worthwhile information to prospective students.

No. 2. As was stated earlier, many start in college without having decided upon a course, or curriculum, and in not a few instances, without having definitely decided to remain at the particular school where they find themselves on registration day. To be met by a competent adviser on the first day may be all that is necessary for a student to be started properly and to his own satisfaction.

Nos. 3–14. If the student finds in the adviser, someone to whom he feels free to go, then all of the other eleven objectives listed by Elliott will be properly cared for when the need arises. It should be possible for the student to arrange appointments with the adviser easily so that when any problem arises he can have it solved before discouragement arises within him.

Jones, in *Principles of Guidance*, Chapter IV, has lists of objectives for educational guidance for different education levels. One of these levels is the college and normal school. The objectives for this level are listed as follows:

1. To help the student to find what each type of college and normal school represents; i.e., what its peculiar function may be, what special opportunities for training it offers, what its general standing among similar institutions is.

2. To help him learn the requirements for admission and the cost of attendance.

3. To help him get some idea of the stand-

[4] See Bulletin No. 102, Oct. 1, 1928, The Eastern Illinois State Teachers College at Charleston.

[5] Koos, Leonard V. and Kefauver, Grayson N., *Guidance in Secondary Schools* (New York: The Macmillan Co., 1933), 640 pp.

[6] See p. 161.

[7] *Ibid.*, pp. 381, 387, and 595.

[8] Published by Ohio State Department of Education, 1930.

ing and accomplishment of graduates of the institutions under consideration.

4. To help him get a clear idea of the various curriculum offerings and the purpose of each.

5. To help him know something about the student life, and the advantages and disadvantages of the particular location.

6. To assist the student in the many adjustments incident to leaving home, and to entrance upon the life in the new institution.

The only one of the six objectives which Jones would make a part of the college responsibility is the last. With regard to it he says:

This is distinctly a part of the responsibility of the college into which the student goes; it is also a part of the responsibility of the school from which he comes.

Had colleges prepared catalogs and descriptive material in such a way that they could be easily understood, the present difficulties with regard to the first five objectives set forth by Jones would be largely eliminated. High-school counselors and parents would be able to assist the pupil to better advantage. The high-school graduate would be more able to figure out for himself his choice of college and the courses or curriculums to choose.

The Orientation Week

Guidance for most college freshmen begins and frequently ends with the first three or four days of the school year. Committees of faculty members and upper classmen plan in advance of registration for get-acquainted parties, picnics, and dances. Tours of the classrooms and campus are made with upper classmen as guides. Department heads speak to assemblies at stated intervals. These proceedings are accompanied or followed by testing programs for various abilities — mathematics, English, general intelligence, aptitude, and mechanical ability.

Registration begins the latter part of the week with some of the strangeness of the situation dissipated though with considerable trepidation added because of the testing programs. Much remains to be done to remedy the deadening formal stand-in-line procedures of the usual registration. Some colleges are getting much of this done in advance by correspondence or by representatives at the high schools from which students come.

College Testing Programs

Trumbull, in *Junior Wage Earners,* under the heading Pupil Adjustment says:

The more recently developed facilities for discovering and measuring various kinds of individual differences, the standardized intelligence tests, and many forms of new type examinations all have become effective means for determining procedures in educational guidance.

Colleges are making an effort to get intelligence ratings for homogeneous grouping and course assignments, but much needs to be done to validate tests and procedures. There is something uncanny about the very idea of tests, testing methods, and the known or suspected purposes of them which often defeats worth-while results, causing them to become instruments for maladjustment rather than useful devices for student advancement.

The interpretation of test results is astoundingly faulty and needs to be aired if any progress is to be made. The mere fact that a child can hit a nail on the head twenty times out of twenty is not a valid criterion for placing him in an industrial-arts or vocational curriculum. Neither is the fact that he can't hit the nail twenty times out of twenty sufficient reason for barring him. The factor of interest, as William James pointed out long ago, is again being conceded by psychologists as a more potent and satisfactory criterion. If one wants badly enough to do a thing, ability will develop.

The intelligence quotient derived from a single test is frequently relied upon as above question and as something standard. Abundant data are now available to prove this assumption false and to warn that the I.Q. had in more instances better be regarded as a fever thermometer than a gazing crystal. A wise physician can make proper deductions from the former.

Doctor Karl M. Bowman, director of the division of psychiatry of the department of hospitals in New York states:

I have seen children with low I.Q's develop into higher intelligence brackets. I have seen children with high I.Q's fall to lower I.Q's with growing maturity and I have seen children with normal intelligence later show a retarded and lower I.Q. Whether the mistakes are made in the examinations I don't know, but we have found definite cases of changes in intelligence quotients.[9]

The editor of *Nations Schools* comments further:

While waiting for round four, may we venture to add Courtis' 1933 observations that "a low I.Q. may be caused by: (1) actual deficiency in nerve and motor mechanism organization or both; (2) the development of faulty habits of response; (3) a low incipiency; (4) deficiencies in training or experience; (5) individual peculiarities in patterns of development. The I.Q. is a relative and not an absolute measure of the rate of growth.[10]

Length of the Guidance Period

Educational guidance for college freshmen should continue beyond the first week of school. There are practically the same kinds of adjustments to be made continually with regard to difficulties and misunderstandings as occur with high-school students. The orientation of the student in the various classrooms, methods of study, standards of grading are factors which must be heeded if the student is to get on well. Practically the same procedures may be used as with high-school students in continuing guidance throughout the year.

Special Attention to Bright Pupils

The late T. J. McCormick of the La Salle-Peru Township High School, La Salle, Ill., had a different angle on the objectives of guidance from the ideas held by most schoolmen, and which may be worthy of study. While he would have guidance serve the purposes of adjustment usually thought of in connection with the dull or backward pupil, he would give more time to the bright student, on the grounds that in this way there will be greater and quicker returns to society for the time spent with the student. His method is that of "mental hygiene."[11] He thought of the main business of guidance as reconstructing common phases of personality as follows:

1. Developing the self-conscious, inadequate personality whose feelings of inferiority may or may not have a real basis.

2. Reducing egocentric tendencies in the student whose self-estimate is too high.

3. Stimulating to greater action the day dreamer, who is rich in vision but poor in genuine achievement.

4. Broadening the childish immature personality from unreasonable excuse forming tendencies.

5. Widening the interest scope of the narrow individual unresponsive to stimuli and inflexible in reaction.

6. Substituting adequate compensations for unsatisfactory defense mechanisms.

7. In general, attacking the unhealthy personality traits and undesirable emotional habits that they may be replaced by more favorable ones.

Whether or not Mr. McCormick's ideas were good, they have some elements in common with the ideas of others and are worthy of study in connection with college guidance because of his plan for bright students. Mr. McCormick's junior college, which was in connection with his high school continued guidance in the same manner. Here again he emphasized what he called the finer things of life, the development of ethics, which he said is the proper end or aim of human life. The seven characteristics pointed out above contained his plan for the reconstruction of personality.

His guidance program, administered with the aid of several staff members, made use of the same devices favored by counselors generally. The "face sheet," called by others the student personality card, which is the usual questionnaire, calls for all the personal information of importance in establishing the student's problems and in remedying them.

Testing programs were followed by forty-five minute conferences with the pupils. The brightest students were called in first for two reasons:

a) They are the most promising and should be given every attention in order that they may not be hindered in any way in making the greatest possible advance.

b) The stigma usually attached to being called in for an interview is removed when it is found out that the best students are called in first.

Results of interviews were carefully tabulated and a cumulative record of each was available at graduation time.

Should College Guidance End with Graduation?

Successful industries find they must guarantee the quality of their products and upgrade them constantly. Improving the

[9] See p. 18. The *Nations Schools*, Vol. 23, No. 2, February, 1939.

[10] *Ibid.*

[11] See Report of Educational Council, La Salle-Peru Township High School, 1923–1926.

materials, selecting better materials, and compounding them better are the methods. The finished article cannot be improved after it has reached the consumer.

The product of the college is the graduate. It too can be improved by selecting for training those high-school graduates most capable of carrying college work. It can be improved by better training methods and facilities at the college. Unlike the manufactured product, it can be improved after it reaches the consumer. Many problems of policy relative to relationships, methods, and discipline face the graduate, who may be the product of a teachers college, which had not impressed him in college. His ability to solve them promptly and adequately will determine his success and likewise the reputation of the college from which he came.

Obviously the college like other schools must have a placement and follow-up program. It must see that the student is located in the kind of work for which he was trained. It must contact him and his employer at such intervals as seem necessary to locate difficulties in the situation and to suggest solutions of them.

The college needs likewise to upgrade its product. Here again much can be done after it has reached the consumer. Suggesting courses to be taken, schools to attend, and methods of improving teaching can be most useful.

How long should the college follow and continue to place the graduate? This will vary with individuals from one to six years. When the college is certain of the ability of the graduate to stand alone, it need be no longer directly concerned though it should always be ready to help when the graduate requests assistance.

Conclusion

Recent years have seen greatly increased enrollments in teacher education centers. This has been due in part to possibilities for employment in the public schools, in part to the fact that there seemed to be nothing else for the high-school graduate to do, and in part to the competition for enrollments on the part of colleges.[12] The results have been overcrowding of certain areas and the sending forth, in too many instances, of persons to teach who might have succeeded better in other areas.

A guidance organization in the teachers college manned with skillful, broadly trained, and unbiased individuals will do much to remedy the situation. Better guidance devices and techniques and a better knowledge of how to use the results for continuous adjustment are necessary. More attention to the interest factor as an index for training and more attention to the I.Q. as an adjustment index rather than a norm will also help to assure better graduates for the places which should have them.

Lastly, the placement and follow-up of the graduate are seen to be responsibilities of the teachers college just as they are of any other type of vocational school. A properly qualified placement director, or a department dean, with a sincere interest in his school and its product can do wonders for the graduate in locating him where he can serve best and in helping him on the job, not only to get over unforeseen obstacles but to grow in the profession.

[12] See in this connection p. 271, Ashley, Lawrence F., "Teacher Education Leaves the Crossroads," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Vol. 27, No. 7, September, 1938.

Course of Study in Industrial-Arts Cabinetmaking—IV

W. H. Bowers

Supervisor Industrial Arts,
High School,
Tuckahoe, New York

This is the fourth and final part of this outline of study.

Mechanical Drawing

Make a three-view working drawing of a bench hook; drawing made to scale. Lettering uniform and at a 60-deg. angle, all dimension lines ¼ in. apart. (Reference French and Svensen.)

Make a two-view mechanical drawing of a taboret, the top of which is octagonal in shape. (Reference French and Svensen.)

Design an occasional or tilt-top table, submit design to instructor, the same to be made into a working drawing, showing as many views as will be necessary to make this object. (Reference: *Practical Book of Period Furniture* by Eberlein, publisher J. B. Lippincott & Co., Philadelphia, Pa., or *How to Design Period Furniture* by Gottshall, publisher The Bruce Publishing Co., Milwaukee, Wis.)

Draw two views, front and side of a Chippendale chair, with Chinese motifs. Secure size and proportions from drawing of same, page 160, *Practical Book of Period Furniture*, by Eberlein. Submit sketch to instructor before making the mechanical drawing.

A mechanical drawing must be made in connection with every project to be made by the student, also any other mechanical drawings in correlation with the subject of cabinetmaking. These drawings are to be made at home, or at school at a period other than the one designated for woodwork.

References for Assigned Readings

Pinchot, *Primer II;* Roth, *First Book,* p. 133; Fernow, *Economics,* pp. 23–33; Brunchen, pp. 95–190; Pinchot, *Adirondack Spruce,* p. 4; Graves, *Forestry Bulletin No. 26,* p. 39; "How to Distinguish the Different Kinds of Wood," reference appendix, pp. 289–292, *Wood and Forest,* Noyes.

The principal species of American woods as to characteristics concerning the appearance of wood habitat, physical qualities, and common uses: White pine, Georgia pine, white spruce, redwood, red cedar, butternut, black walnut, yellow birch, beech, chestnut, oak, yellow poplar, sweet gum, cherry, mahogany, maple, basswood. (Pp. 57–196, Chapter 3, *Wood and Forest,* Noyes.)

The Distribution and Composition of the North American Forest

Reference Chapter 4, *Wood and Forest* by Noyes.

The Forest Organism:

Moisture; temperature; light; classification of trees — seedlings, saplings, poles, standards, veterans. (Chapter 5, *Wood and Forest* by Noyes.)

Natural Enemies of the Forest:

Wind, water, drought, lightning, fires, snow and ice, animal, vegetable. (Chapter 6, *Wood and Forest* by Noyes.)

Describe in detail the vast influence of the Brothers Adam upon English furniture. Give a biographical sketch of the Adelphi, and the reasons for their success. Describe the following: contour, articles made during this period, materials used, manner of decoration, structure and finish. (*Practical Book of Furniture* by Eberlein, Chapter 7.)

Describe the Hepplewhite style of furniture and state how it differed from previous periods. Describe its chief characteristics. (*Practical Book of Period Furniture,* Chapter 8.)

Give a biographical sketch of the life of Thomas Sheraton. Describe his versatility, mechanical ability, etc. Describe the most salient traits of his work. (*Practical Book of Period Furniture,* Chapter 10.)

Describe the chief characteristics of the Empire Period — 1793–1830. (*Practical Book of Period Furniture,* Chapter 12.)

Describe the chief differences between American Empire furniture and English Empire.

Write the biographical sketch of the life of Duncan Phyfe in detail. Describe the

distinctive quality of his furniture and some of his masterpieces. (*Furniture Masterpieces of Duncan Phyfe* by Charles Cornelius.)

Assigned Readings

NOTE: A written report required on each assignment.

The structure of wood. Chapter 1, Reference — *Wood and Forest* by Noyes, covers the following topics:

Timber-bearing trees; Sections (sapwood, heartwood, pith, bark, cambium); nonporous wood; ring-porous wood; diffuse-porous wood; the grain of the wood (regular, irregular, cross grain, curly grain, birds-eye maple, knots).

Draw section three, trunk of tree. *Wood and Forest*, p. 39.

Properties of Wood

Shrinkage, weight, strength, elasticity, cleavability, hardness, toughness.

References

Adams, *Projects in Furniture Making* (Milwaukee: The Bruce Publishing Co.).

Brancken, *North American Forests and Forestry* (New York: G. P. Putnam and Sons).

Brown and McGee, *Instructional Units in Wood Finishing* (Milwaukee: The Bruce Publishing Co.).

Brown and Tustison, *Instructional Units in Hand Woodwork* (Milwaukee: The Bruce Publishing Co.).

Cornelius, *Furniture Masterpieces of Duncan Phyfe* (Garden City, N. Y.: Doubleday Doran and Co.).

De Bless, *Genuine Antique Furniture* (New York: Thomas Y. Crowell Co.).

Eberlein, *Practical Book of Period Furniture* (Philadelphia: J. B. Lippincott Co.).

Ensinger, *Problems in Artistic Wood Turning* (Milwaukee: The Bruce Publishing Co.).

Fairham, *Carpentry for Beginners* (Philadelphia: J. B. Lippincott Co.).

French and Svensen, *Mechanical Drawing for High Schools* (New York: McGraw-Hill Book Co., Inc.).

Gottshall, *How to Design Period Furniture* (Milwaukee: The Bruce Publishing Co.).

Harmes, *Furniture of Yesterday and Today* and *Furniture for the Amateur Craftsman* (Milwaukee: The Bruce Publishing Co.).

Hjorth, *Forty Fine Furniture Designs* and *Reproduction of Antique Furniture* (Milwaukee: The Bruce Publishing Co.).

Klenke, *Art and Education in Wood Turning* and *Selected Furniture Drawings* (Peoria, Ill.: Manual Arts Press).

Kepler, *Mechanical Drafting Handbook* (Milwaukee: The Bruce Publishing Co.).

McGee and Sturtevant, *General Mechanical Drawing* (Milwaukee: The Bruce Publishing Co.).

Madsen and Lukowitz, *Problems in Furniture Design and Construction* (Milwaukee: The Bruce Publishing Co.).

Milton and Wohlers, *Course in Wood Turning* (Milwaukee: The Bruce Publishing Co.).

Noble and Everill, *From Forest to Woodworker* (Milwaukee: The Bruce Publishing Co.).

Noyes, *Handwork in Wood* and *Wood and Forest* (Peoria, Ill.: Manual Arts Press).

Osburn and Osburn, *Measured Drawings of Early American Furniture* (Milwaukee: The Bruce Pubilshing Co.).

Pelan, *Care and Repair of the House* (U. S. Bureau of Standards, Washington, D. C.).

Pinchot, *A Primer of Forestry*, Parts I and II (Department of Agriculture, Washington, D. C.).

Roth, *A First Book of Forestry* (Boston: Ginn and Co.).

Shea and Wenger, *Colonial Furniture* and *Provincial Furniture* (Milwaukee: The Bruce Publishing Co.).

Ternow, *Economics of Forestry* (New York: Thomas Y. Crowell Co.).

Waring, *Principles of Mill and Paint Shop Practice* (Milwaukee: The Bruce Publishing Co.).

Worth, *101 Things for a Boy to Make* (Philadelphia: J. B. Lippincott Co.).

Lessons for Young Workers—XIV

Thomas Diamond

Vocational Education Department,
University of Michigan,
Ann Arbor, Michigan

Partners in Industry

Ignorance, it is clear, at the present moment is responsible for the stemming of the tide of prosperity which would result from a rapid increase of production. The ignorance of the economic position is no doubt greater among workers than among employers. But all the ignorance is not on one side. Yet even if it were, whose is the responsibility? Cannot a great deal of that ignorance be traced to the simple fact that the worker has never been enlightened, that such questions as output are considered to be beyond his province? Yet the connection between wages, profits, and output is most intimate. The worker has been allowed to concentrate all his attention on wages, whereas, if he is to be convinced of the necessity for increasing output, he must be made just as well acquainted with the costs of marketing the results of his labor, and with the profits therefrom, which are no more than the rent of the capital which provides him with the means of utilizing his energies.

Erroneous Conclusions

Unless he is made acquainted with such details he is apt to arrive at erroneous conclusions. He can calculate the cost of labor in production, he can learn the price the consumer pays for the manufactured article, and he hears of profits amounting to thousands of dollars being made by the employer, either a private individual or a limited liability company, who has organized the production. He comes to the conclusion that he does not receive his fair share of the proceeds of his labor. Knowledge of the unseen machinery of commerce is the only means by which he can be led to perceive that higher wages without increased production can only mean an increase in the cost of living. This ignorance on the part of the worker is really at the root of industrial unrest.

A Grave Responsibility

Is not the main reason why the workers have been allowed to remain unenlightened on these important matters due to ignorance of another matter on the part of employers? The latter is apt to consider that his interests come first. He knows that without the assistance of his capital any modern industrial community would perish and the individual members of it die of starvation. He forgets that without labor his capital is without value, mere lumber of no use to himself or to the community at large. The withdrawal of labor from any industrial enterprise is just as fatal to its progress and prosperity as the loss of capital. A complete and total boycott of a factory by labor would have exactly the same effect as if the factory were uninsured and were totally destroyed by fire. A strike at the works should not be needed to drive home the lesson that labor and capital are mutually dependent upon each other.

The Real Partnership

The fact is that capital and labor are partners in industry. Their interests are identical — to produce commodities. But the two partners will never get the best results from their partnership while they are at variance, while the pair of them are quarreling for the empty distinction of being "boss." There should be no more question of capital bossing labor than of labor bossing capital. It is only ignorance on both sides which breeds strife. The sweeping away of that ignorance is largely in the hands of the employer — the capitalist. It is in his power to make clear to the worker that they are partners. With labor a willing partner in the industrial firm the future would be bright indeed. Yet labor will never be a willing partner until the partnership is made real. That will happen when capital takes labor into the board room. — From the *Manchester Guardian*.

The Kingdom of Kindness

Dean M. Schweickhard

Assistant Superintendent of Schools, Minneapolis, Minnesota

Goods and Good Will

The different seasons of the year carry with them variations in agriculture, weather, transportation, and industrial activity; but the greatest distinctions which have come to exist between one season and another have to do with the special significance attached to them in the hearts of men. It is well that this is so, for from the recurring observance of these special occasions there comes the inspiration so essential in meeting and dealing successfully with the everyday affairs of life.

Underlying the observance of the Christmas season there is the fundamental idea of good will, and an act of good will is found to be synonymous with kindness. In seeking to observe the genuine spirit of this season then, the element of kindness must occupy a place of considerable importance.

Someone who prides himself on adhering closely to the practical affairs of life may say that this is merely sentiment, but observation reveals instances of this very sentiment entering into the affairs of government and business. There is frequent interchange of good-will delegations from city to city. Envoys from one country make good-will tours to other countries. And where the feeling of real good will becomes most firmly established the inclination toward bitter disagreement and conflict is slowest in coming.

Are we to assume that these moves are always made with an eye to commercial interests or better business? Perhaps so, if we can agree that better business and sounder industrial development can be built most perfectly upon the establishment of more sincere and agreeable human relationships. It is hard to imagine a situation, in the present-day world, where human beings could deal with each other without basic consideration of their physical needs and the material means for supplying them. In a complex society these needs must be supplied through the interchange of commodities and services, and the symbolic representation of these values in money. So long as the exchange continues the system works, but when a surplus accumulates where it cannot be used satisfactorily to the benefit of humanity, financial stagnation results and social fermentation begins.

Even in the intimate relationships of families and personal friends, tangible gifts which can be looked at, handled, possessed, and used, are the tokens by which devotion is expressed. May they not, if exchanged on an honest and straightforward basis, also be the means of promoting feelings of human kindness and good will over a broader scope? The importance of this outreach looms even larger as we follow it through to its conclusion, for through the increased production and distribution of goods, business is stimulated, more jobs are created, and more individuals are enabled to secure the things which bring joy and happiness into the home circle.

Modern civilization itself is predicated upon the principle of good will and is nourished by the use of goods. Temporary retardations are caused by inappropriate relationships between the two. Ultimate progress can be made through technical or industrial accomplishments only in the extent to which they are accompanied by contemporary enlargement of the spirit of human consideration.

A Fertile Field in the School

Long before the Christmas season actually arrives its spirit pervades industrial-arts shops throughout the country. It is found to be present in the small meagerly equipped shops, as well as in the more elaborate ones, for in all of them boys are planning, thinking, and working on projects which hold even more than the usual amount of interest. The real cause of the increased interest lies in the willingness, even eagerness, of the boy to put his very best into the creation of an article intended to bring joy or happiness to the one who will receive it.

The joy of the parent, relative, or friend who becomes the recipient, comes partially from becoming the possessor of an article of value and use, but much more from the devotion revealed through the expenditure of time, effort, and cherished savings. If the perpetuation of financial support for industrial arts in the schools were to depend entirely upon the commercial values of the finished articles taken home by the boys it would probably not long continue. When this factor is coupled with the satisfaction of the parents derived from the successful accomplishments of their children, however, there is little doubt about a reaction favorable to loyal support for the work.

In numerous other aspects of schoolwork the attention of parents, and others immediately interested, is brought to a particular focus at Christmas time, but it all comes through the things they can see, hear, or touch. Plays and other dramatic works are made even more real through the help of the domestic-art department in devising costumes, the industrial-arts shops in constructing scenery, the art department in painting it, and the music department in providing the necessary instrumental and vocal background. Such instances only serve to impress upon us still further that even in the promotion of kindness and good will through the schools, tangible demonstration of educational values carries the greatest weight.

Before proceeding far, however, one is certain to encounter the argument that the cultivation of desirable character traits is all right in school, through whatever instrumentality is found to be most effective, but that at best the school represents a sheltered situation, the conditions of which cannot be transplanted into actual life. The solution lies not in lowering the ideals of the school, but in accomplishing a clearer interpretation of those ideals in terms of life values. The modern tendency in education has been to bring more of real life into the schools. The major problem before us now consists in making the lessons learned in school so vital and full of workable value that they may be carried out into life to a greater degree.

Effective Strength

In the eyes of the world the traits of character emphasized by the schools, such as kindness, are sometimes looked upon as indications of weakness. By way of contrast attention is diverted to the physical world, and in the search for demonstrations of strength, things commonly used for illustration are stone pillars, steel girders, and rugged sinews. If the thinking is carried into the field of human characteristics undue significance is too frequently attached to austerity, domination, and even brutality as indications of strength. On the contrary the exhibition of such traits in actual fact is more likely to be the outward defense used to blind the observer to the real feelings of fear or weakness within.

In the nation of China there grew up long ago a tradition which frowned upon physical combat between individuals on the streets or in public places. The underlying philosophy was that the one to strike the first blow, by his very act admitted that he had reached the limit of his moral courage, and had resorted to the weaker alternative of physical attack. Needless to say, the Chinese people have not always carried this principle through in practice, but they have produced some excellent embodiments of it among their population.

Regardless of the way in which it is demonstrated outwardly, kindly consideration toward others is probably one of the most potent factors in guiding our civilization in an altogether desirable direction. Wherever it is put into practice it tends to eliminate hatred, jealousy, suspicion, and distrust; to remove selfishness, deception, and graft; and to soften the force of anger and impulsive action. In a more positive sense the more widespread practice of human kindness will help to promote fair dealing, tolerance, love, and generosity; and to develop sounder faith, keener joy, and more stable emotional control. These things are needed to quell the turmoil of world affairs. Toward this end the Christmas season offers a brilliant opportunity to let kindness have a larger place in the human heart, and from there to spread into every corner of the earth.

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

J. J. Metz, Editor

Vocational Education to the Forefront

It is heartening for those interested in vocational education to read that John W. Studebaker, U. S. Commissioner of Education, expresses the opinion that the increase of 25 per cent in the enrollment in vocational courses during the past year indicates a national swing from academic types of education to a more practical program of specific training for vocations. He believes that the continued upsurge in evening-school enrollments for the employed and unemployed in 1939, may presage a record development of vocational education.

This turn toward vocational education is easily understood if one sees the dilemma in which many of our young people find themselves after they have finished general courses which leave the young with a feeling of bewilderment rather than of accomplishment. It is true that what these general courses have given may all be very much worth while. The sad part is that such a large percentage of those who have taken them do not know how to apply the general information which they have obtained to the specific jobs which they enter.

Vocational education, with its direct approach, even if it is empirical at times, is of much more value to a large percentage of those who attend school than the general courses commonly found in high-school curriculums. The girl or boy who has had the opportunity of taking a cooperative course in one of the newer setups in the distributive occupations or in the miscellaneous trades, leaves school with a feeling of having a grasp of something that is tangible.

Vocational education, therefore, has an appeal that must be recognized, and more effort ought to be expended in making it available to a greater number of those who are below the compulsory-attendance age.

Giving Recognition

Recently Miss Anna Heldman, who had worked for over 36 years at the social improvement of the underprivileged living in the vicinity of the Irene Kaufman Settlement in Pittsburgh, was signally honored by her community. She was called to the mayor's office and presented with a sealed ordinance stating that the name of Overhill Street, where she had spent so much time working for the poor and downtrodden, had been renamed, and that henceforth it would be known as Heldman Street in her honor.

Some may scoff at this and say, "What good will that do her?" True she was no richer, as riches are reckoned, after her name had been given to a street, than she had been before. Nevertheless, knowing human nature, knowing ourselves, we can easily realize how much that ordinance meant to this earnest, hard-working social worker. That document was to her a legal notice telling her that her work was not only recognized, but that it was appraised as being very much worth while. It took the place of the friendly pat on the back which we all relish.

There are many teachers who are doing excellent work, and yet they are merely taken for granted. They are of the quiet, unobtrusive kind who never push themselves to the front. In spite of their modesty, they, too, appreciate a word of praise. Let's be a little more generous in giving the other teacher credit. Viewing the other man's work unselfishly and with sympathetic understanding will materially help to make this sordid world a much finer place to live in for both the one who receives and the one who gives recognition.

The Success of the Teachers of Agriculture

Agricultural teachers, especially those teaching vocational agriculture, have succeeded in developing homework assignments in the form of projects that really register. Frequently, these projects as carried out by the school children not only net extra money for the student, but they also serve as attention-getters for the adults in the home. Not infrequently, the fathers and mothers become so interested in what their boys and girls are learning that they, too, enroll in classes when such are offered from time to time. Occasionally energetic and capable agricultural teachers have so influenced the adults through their students that ineffectual methods of doing certain kinds of farm work, which had become common in a community, were entirely changed.

These agricultural teachers have developed a method of influencing the home. Can the instructors of industrial arts and vocational education develop similar projects in their fields? It is conceded that the problems confronting the teachers in these various fields are by no means comparable, yet the methods applied by the agricultural teachers, and the success they have achieved, are worthy of study.

Schools of Our Country

John W. Studebaker, Commissioner of Education, Washington, D. C., has released the following interesting figures about the schools of our country.

September saw the return of about 33 million men, women, and children to our schools. They are taught by approximately 1,073,000 teachers from kindergarten to college in public and private schools. About 100,000 of these teachers are teaching for the first time this year.

The investment in school plants, endowments, and trust funds is more than $12,000,000,000. New buildings, equipment, repairs, and supplies will require another $2,659,000,000. About 50 per cent of this will go to the elementary schools, 31 per cent to the secondary schools, and 19 per cent to universities.

The enrollment in the elementary school amounts to approximately 21,750,000 children of whom 2,060,000 have entered school for the first time.

The public-high-school enrollment is about 7,200,000 and the private high schools take care of about 400,000.

The average annual salary for rural teachers is $827 and for city teachers $1,818.

From the foregoing, it is evident that the school system of the United States is decidedly big business as far as money and the number of persons contacted goes. The information presents a roughly delineated picture of the physical equipment needed to educate the youth of our nation. Probably the most surprising statement is that about the average salaries of teachers. Apparently America has great confidence in its teachers for it entrusts much valuable property and still more valuable humanity to them, but evidently feels that a small annual stipend is all that is required for the services they render.

Vocational Interests of Junior-High School Boys

Harry G. Eberhardt

Associate Professor of Education, West Virginia State College, Institute, West Virginia

A study of the vocational choices of 600 junior-high-school boys in New York City.

The problem attempted in this investigation was to: (*a*) determine the vocational choices of junior-high-school boys, (*b*) ascertain the factors influencing the choices of vocations, (*c*) compare the choices of junior-high-school boys with the occupations entered into by the gainfully employed male workers 10 years old and over in the various general divisions of occupations in the United States in 1930. The major assumptions underlying this investigation are: (*a*) that junior-high-school boys do think in terms of their life's work, (*b*) that their choices are influenced by a number of factors, (*c*) that their choices do not take into consideration possibilities for employment.

Selection of Cases

The six hundred cases were selected from a group of approximately twenty-two hundred boys in the New York City public schools. They came from grades 7A9, 7B1, 7B3, 7B4, 7B6, 7B7, 7B8, R.A., 8A2, 8A3, R.B., 9A1, 9A2, 9A3, R.C.

The ages of the subjects ranged from 12 to 21, with a median of 17 years 3 months. The intelligence quotient could be had for only 80 per cent of the group. These quotients ranged from 86 to 132, with the median at 102.

The data were collected from record cards in the counselor's office and by personal interviews with each boy. The cards were carefully studied and a check list was made. Each boy was called in for an interview so that his answers on the card could be checked. The boys were asked to give their vocational choices and the reasons for choosing that particular vocation. Each boy seemed to have been sure that the occupation chosen was the one he liked best.

Results

Table I gives the distribution of choices made by the 520 boys who had made up their minds as to what they wanted to do in life. Eighty were undecided. A careful study of the distribution reveals many differences in interests. There were about 110 different occupations in the original list, but some were combined to save space and time. There seems to be a tendency for the choices to follow the professions and other occupations for which these boys do not have the capacity. The grades, for the most part, show that junior-high-school boys want to enter occupations based upon subjects in which they have very low grades. Great opportunities for studying large numbers of occupations, and closer attention on the part of the counselor to vocational interests of these boys should cause this picture to change its shape considerably.

Factors Influencing Choice

The question which called for information concerning the reasons for selecting a particular vocation, brought a large number of answers. There were one hundred in the original list. They, too, had to be combined to save space. Table II gives these results. The reasons ranged from, "I like it," with a frequency of 135 or 25.98 per cent to "It is the only thing people say I am cut out for" with a frequency of 1 or .19 per cent. Money, desire to travel, desire to render service, educational advantages, sure job, and parental influences have also been outstanding reasons given in this investigation. The list, as a whole, does not show substantial reasons for choosing the various occupations.

Divisions of Occupations Into Which the Vocational Choices Fall

In Table III, an attempt was made to group the vocational choices into the general divisions of occupations as listed in the United States Census report, as shown, and nine out of ten major divisions of occupations are represented. Only one, Forestry

TABLE I. Differences in vocational choices of 600 junior-high-school boys in New York City in 1935

Vocations Chosen	*Number*	*Per Cent*
Physicians	64	10.67
Post-Office Work	38	6.33
Teachers	36	6.00
Electricians	35	5.83
Engineers	30	5.00
Musicians	28	4.67
Radio Mechanics	26	4.33
Airplane Mechanics	24	4.00
Government Work	23	3.84
Aviators	22	3.67
Scientists	21	3.50
Artists	15	2.50
Auto Mechanics	15	2.50
Printers	14	2.33
Chemists	13	2.18
Dentists	12	2.00
Newspaper Reporters	12	2.00
Policemen	10	1.67
Carpenters	10	1.67
Lawyers	9	1.50
Detectives	9	1.50
Naval Pilots	4	.67
Athletic Work	4	.67
Inventors	3	.50
Cartoonists	3	.50
Lawyer or Engineer	3	.50
Office Work	2	.33
Translators	2	.33
Chauffeurs	2	.33
Miners	2	.33
R. R. Engineers	2	.33
Cooks	2	.33
Actors	2	.33
Naval Officers	2	.33
Firemen	2	.33
Tailors	2	.33
Draftsmen	2	.33
Shopwork	2	.33
Ironwork	2	.33
Lawyer or Doctor	2	.33
Sign Painters	2	.33
Engineer or Doctor	1	.17
Grocer	1	.17
Garage Work	1	.17
Optician	1	.17
Doctor or Aviator	1	.17
Farmer	1	.17
Shoemaker	1	.17
Total	520	86.67
Undecided	80	13.33
Total Pupils	600	100.00

TABLE II. Number and per cent distribution of reasons, for choosing occupations, as given by 520 junior-high-school boys

Reasons	*Number*	*Per Cent*
I like it	135	25.98
I do not know	102	19.61
I want to make money	93	17.78
I like to save lives	20	3.85
I like to travel	20	3.85
I want to render service	19	3.65
It is a good job	16	3.08
My mother likes it	15	2.88
It is my father's occupation	14	2.68
Want to make my mother proud	13	2.50
It is a sure job	12	2.30
Because it is hard	10	1.95
It is educational	10	1.95
I like adventure	7	1.35
It is a clean job	5	.95
My uncle's occupation	2	.38
I like to use a knife	2	.38
It is thrilling	2	.38
It is a growing occupation	2	.38
I have the capacity	2	.38
I want to be scientific	2	.38
I want to protect citizens	2	.38
I want to help the sick	2	.38
I think it is good	2	.38
It will keep me busy	2	.38
I want to be outstanding	2	.38
I would like to produce	2	.38
It requires brains	2	.38
It is exciting	2	.38
It is the only thing people say I am cut out to be	1	.19
Totals	520	100.00

TABLE III. Number and per cent distribution, by general division of occupation, of vocational choices of 600 junior-high-school boys

General Division of Occupation	*Number*	*Per Cent*
Agriculture	1	0.8
Forestry and Fishing	0	0.0
Extraction of Minerals	2	0.3
Manufacturing and Mechanical Industries	102	17.1
Transportation and Commerce	84	14.0
Trade	34	5.6
Public Service	83	13.8
Professional Service	209	34.8
Domestic and Personal Service	2	0.3
Clerical Occupations	2	0.3
No Choice of Occupations	80	13.0
Total — All Occupations	600	100.0

and Fishing, was left out of the picture. The professions, manufacturing, transportation and commerce, and public service led with frequencies of 209, 102, 84, and 83 respectively. Eighty or 13 per cent of the boys failed to make a vocational choice.

Trends in Occupations Chosen

Table IV shows the general trends, over a period of thirty years, of occupations chosen by boys of approximately the same age as those studied. Table V gives a comparison of the United States data for 1930, and the distribution of choices made by the junior-high-school boys in 1935. In no case is there a very close relationship.

Summary and Conclusion

1. This investigation has concerned itself with the vocational choices of junior-high-school boys and the factors influencing their choice, on one hand, and with a comparison of these choices with the distribution of gainfully employed male workers 10 years old and over in the United States in 1930 on the other. It has proceeded under the following assumptions:

a) That junior-high-school boys do think in terms of their life's work.

b) That their vocational choices are influenced by many factors.

c) That little consideration is given to the possibilities of employment in choosing vocations.

TABLE IV. Per cent of gainful male workers 10 years old and over, by general division of occupation, for the United States, 1910–1920–1930

General Division of Occupation	*Per Cent*		
	1910	*1920*	*1930*
Agriculture	35.2	29.0	25.1
Forestry and Fishing	00.8	00.8	00.7
Extraction of Minerals	03.2	03.3	02.6
Manufacturing and Mechanical Industries	29.4	33.0	32.1
Transportation and Commerce	08.5	08.7	09.4
Trade	10.5	10.8	13.4
Public Service	01.4	02.2	02.2
Professional Service	03.2	03.5	04.5
Domestic and Personal Service	04.1	03.6	04.7
Clerical Occupations	03.8	05.1	05.4
Total — All Occupations	100.0	100.0	100.0

2. The cases for the study were selected so as to show a cross section of approximately twenty-two hundred boys in New York City.

3. Record cards and interviews were used as a means of gathering the data.

4. The data were presented in number and per cent distributions according to frequencies.

5. A comparison was made to show necessary relationships called for in the investigation as stated in the problem.

6. It was shown that 86.67 per cent had chosen a vocation and only 13.33 of them failed to make a final choice.

7. The distributions covered 48 different occupations which were selected for 30 different reasons.

8. The investigation further shows that there is a need for more vocational guidance in the choice of vocations on the part of junior-high-school boys.

9. It is urgently recommended that studies of similar groups be made in different sections of the country and that investigators consider the possibility of making a study of this kind that would reveal information of national importance.

TABLE V. Per cent of gainful male workers 10 years old and over in the United States in 1930, and vocational choices of 600 junior-high-school boys in 1935

General Division of Occupation	*Per Cent*	
	Gainful Male Workers 10 Years Old and Over	*600 Junior-High-School Boys in New York*
Agriculture	25.10	00.8
Forestry and Fishing	0.70	00.0
Extraction of Minerals	2.60	00.3
Manufacturing and Mechanical Industries	32.10	17.1
Transportation and Commerce	9.40	14.0
Trades	13.40	5.6
Public Service	2.20	13.8
Professional Service	4.50	34.8
Domestic and Personal Service	4.70	0.3
Clerical Occupations	5.40	0.3
Total — All Occupations	100.00	87.0

The Oil Laboratory

Stuart McLoughlin

University of California,
Los Angeles, California

Mechanisms need lubrication, and since this is an age of mechanisms, it behooves everyone to know somewhat of the qualities of lubricants. Modern machinery has been perfected to the point where little or no adjustment or repair can be performed by the layman. In the main, modern mechanisms give remarkable performance, compared to previous types. In case of a breakdown, specialized knowledge on the part of the mechanic, and specialized equipment for testing and repairing, are imperative. Lubrication, however, still is under control of the average operator.

At the university, the testing and consideration of oils is given in connection with a course in fundamentals of Diesel engine practice. Emphasis is thus placed upon oils which suitably lubricate internal-combustion engines.

Mr. James W. Marsh, professor in the mechanic-arts department of the university, has organized the course which has rapidly become one of the most popular in the department.

Part of the class time is spent in discussions, during which the history of petroleum from its probable beginning in the carboniferous period to the present modern methods of recovery and refining, are brought out. The remainder of the time in the laboratory is devoted to making a series of tests upon oils. After the routine series of tests, opportunity is offered to make special tests on crankcase drainings, or on a particular type of oil, not necessarily for lubrication, which someone may send in for a determination of its relative merits. While the tests upon crankcase drainings are made chiefly to determine the operating condition of the engine, they are conducted in much the same way as the routine tests. They are intensely interesting, however, because they indicate the comparative efficiency of the engine, and afford an opportunity to observe the chemical or physical changes which take place in actual use.

An example of consumer education which may be expanded into fields other than the one described in this article.

Oil Tests

The routine tests are those which most oil refinery laboratories use; namely, determinations of: base, viscosity, flash and fire, free carbon, acid, alkali, adulterants (aluminum oleates and caoutchouc), cold (pour) emulsion and demulsion.

The base test is made by an accurate hydrometer or a Wesphal balance. It serves as an indication of the source of the crude petroleum (eastern, mid-continent, or western).

The viscosity is discovered by the use of a Saybolt universal viscosimeter. This is an important factor for the consumer, as ordinarily the thinnest oil which will provide effective lubrication is the best, though more will be stated concerning this later.

The flash and fire tests are performed with a Cleveland open cup. A high burning point is usually considered desirable, providing that the difference in temperature between the flash point and the burning point is small. The point at which an oil will cease lubricating and give itself up in flame should be near the point where it is to be hoped that it will burn quickly and cleanly.

The free carbon test is also known as the Conradson carbon test. It is important to know the free carbon content of a new oil, but it is even more important to test an oil after a certain period of use for free carbon.

Acid left in the oil by improper treat-

ment, or careless refining would seriously harm an engine in which it was used. This is especially true of some of the newer types of alloy bearings. The test for acid is made by washing an oil with pure, warm water, and then checking that wash water with sodium hydroxide and phenolphthalein.

Alkali is discovered by the foregoing method:

Aluminum oleates and caoutchouc are found by forming a solution with ether, alcohol, and phosphoric acid, and the oil to be tested. This is then centrifuged, after which the adulterants or impurities, having been precipitated, may be observed. In practice it is found that many oils contain traces of the clay used for filtering, an indication that the oil was improperly centrifuged.

Oil is tested for cold-weather possibilities by immersing a tube containing the sample in a cold bath, and noting the temperature at which the oil ceases to flow.

Whether an oil will enter into an emulsion with water is determined by violently stirring a combination of oil and water in a test tube. The rate of settling gives a demulsibility curve. It is found that some oils serve better as vehicles for cutting compounds in machine shops than as lubricants for motor vehicles.

Economic decisions must be made after careful study and wide observations, according to Professor Marsh. For valid testing a battery of tests must be used. No one test is sufficient by itself. Some oils may have one good point, some another; none of them are perfect.

A good lubricant should have: low cohesion, high adhesion, proper viscosity, and film strength.

A new quality is now sought, which for lack of a better term may be called oiliness. It is that property inherent in some fluids which causes them to reduce friction between bearing surfaces.

For a specific purpose several points should be studied before selecting a lubricant, such as the weight which the lubricating film must support, the speed of the machine units affected, and the heat which the lubricant will attain while under service.

Normally, low speed, medium weight, and medium temperature indicate a heavy oil, while the converse is true for a light-bodied oil, although the chemical and physical changes which the oil will undergo while in service must also be considered. Other factors also enter into the problem, so that prescribing an oil necessitates the service of a chemical engineer experienced in petroleum practice.

Teaching Aids

In this course, all the visual aids known to modern practice are used, such as: opaque plates, translucent slides 3¼ by 4 in., 35-mm. film slides, moving pictures, field trips, and specimens of minerals, and other materials pertaining to the study.

Where the necessary equipment is available, opaque plates are the most useful because related material from books may be projected for the class with a minimum of teacher effort.

Translucent slides are the oldest and the most common of projection material. They are very useful, because they can be projected with a comparatively inexpensive lamp. There is the danger, however, that they are still used after the material on them has become antiquated.

The film slide is a late development in the still-picture field, but one which is gaining wide favor, due to the ease with which pictures may be prepared and exhibited. This type offers unlimited possibilities to the resourceful user, as he is able to select his own examples to illustrate the particular subject under discussion. This is a decided advantage over the slides which are prepared by anyone other than the user, though these latter are far preferable to lessons without illustration. In addition to the usual type of original pictures, copies may be made of printed material such as plates, diagrams, and even the printed page. All pictures are thereby rendered uniform in size, precluding a difficulty met with in some other types.

Moving pictures may frequently be borrowed from producers and refiners of oil, who not infrequently will send a representative to show the picture and answer such questions as the students may ask about lubrication.

Field trips have been used universally since the earliest records of education, but some teachers do not make much use of them due to difficulties of organization and administration. They are to be commended highly, however, and as much use as possible should be made of them.

Specimens, which may be passed about the class, are not new either, but they are quite worthy of mention, and evidence the enthusiasm and resourcefulness of the teacher. They may be accumulated by years of alert travel and exploration.

Reports on Tests

Reports by the students are to be made about the oils that have been tested, always keeping in mind it is the oil which is under consideration, not the source. The condition of the oil when received should be carefully noted, to show whether it is from a barrel and sold in bulk, or in sealed tins. The quality of the oil and its treatment during processing, and not the identity of the manufacturing company is the important thing to be considered in these tests.

A good type of crude, improperly treated, may easily be worse than a poor crude, carefully processed. This is an interesting point concerning eastern and western crudes. Although the former require less treatment than the latter, it is comparatively expensive; thus a western crude, properly refined, may be superior to an eastern oil, the manufacturer of which has embarked upon an ill-advised program of economy.

The same may be said about so-called reconditioned oil. Some of this has been allowed to settle, is filtered, and foisted upon the customer. Properly redistilled, correctly filtered, and carefully blended with a high-grade neutral oil to thin it to a desirable viscosity (redistilling always makes oil thicker) such oil which has been used in an internal-combustion engine may probably be advantageously used over. Some bus lines, and municipal police and fire departments are now equipped to do this type of refining.

Emphasis Upon Conservation

Not an inconsiderable part of education to fit young people to be intelligent and useful citizens is the economics of conservation. Stuart Chase in his *Economy of Abundance* dwells upon this topic. D. C. Doyle, writing in *Harpers* for October, 1937, reiterates its importance. President Roosevelt, in frequent radio messages has shown his understanding of and sympathy with such a program. Since the first use of petroleum products, refiners have been notoriously wasteful of this valuable natural resource. At first, gasoline was a great source of nuisance to the oil distilleries — it could not be included in too large amounts with the principal product, kerosene. An enraged citizenry passed laws prohibiting manufacturers from pouring it upon river waters; ingenuity was rewarded to find new uses for the annoying fluid. It was used in flares, attempts were made to familiarize housewives with its possibilities for cookstoves, but nothing was very successful until the auto came along to become the chief consumer of gasoline.

At the present time, when conservation of natural resources is being stressed more and more, the petroleum producers are constrained, by economic competition and legislative enactments, to hoard their reserves. Waste is not countenanced, but the refiners do not wait to be ordered; the demands of the trade make them anxious to adopt all modern methods of utilization and reclamation.

The reclaiming sump is a very important part of the up-to-date refinery; it removes dangerous fluids from sewage and contributes to the financial success of the organization.

The use of casing-head gasoline to blend with refined gasoline may improve the product, become a source of added revenue, and stop waste which formerly was rampant.

These are but a few of the many applications of conservation, whose principles are continually held before the student.

Conclusion

While this is a very sketchy outline of the course, it may nevertheless be of interest to teachers who are attempting to inaugurate consumer-type courses themselves. The mere reporting of such an activity may inspire some, and may confirm others who are looking toward progressive education with its many ramifications.

It is to be anticipated that more of this type of education will be undertaken in the near future, because it does contribute toward fitting youth to be intelligent and useful citizens.

A Research Library

Albert F. Siepert

Dean of Education,
Bradley Polytechnic Institute,
Peoria, Illinois

In the President's Annual Statement delivered during the June, 1939, Commencement program at Bradley Polytechnic Institute, mention was made of an unusual gift. Charles A. Bennett, a member of the original faculty when the Institute began its work in 1897, and for forty-two years editor of the *Industrial Education Magazine,* had arranged to give his personal library to Bradley. During the summer months, this material has been brought to the campus and prepared for use. It will be known as the "Charles A. Bennett Collection" and be made available for various research projects.

The Collection may be classified under four principal heads: (1) Books purchased by Mr. Bennett to carry on the necessary research for writing the two books *History of Manual and Industrial Education up to 1870,* and *History of Manual and Industrial Education, 1870–1917;* (2) pamphlets, reports, paper-bound printed matter, and clippings accumulated during more than forty years of editorial experience in publishing the *Manual Training Magazine,* now called the *Industrial Education Magazine;* (3) books containing courses of instruction or of a technical character published during the early years of the development of handwork instruction in Sweden, England, France, Germany, and America; (4) some hard-to-find books on art and art instruction before the middle of the past century, as well as books by representative American writers on the history and philosophy of education.

This library has been the working tool of one man. It represents the results of search for printed materials and the purchases made during the professional career of a half century. It was not originally intended for the use of others. It is therefore not complete as to sets of books nor complete magazine files. The collector, however, purchased such books and preserved for later use, such materials as gave promise of later value. The result is a library quite unusual in two respects: (1) the material contained, and (2) the manner of its grouping. Some idea of the scope covered by the material can be gained by the outline which follows. The grouping or classification plan departs somewhat from orthodox library practice. It has been developed through years of working with the material, and consists of an arrangement whereby all related materials — books, pamphlets, reports, and clippings — are grouped together and placed on the same shelves. In this way, material is readily accessible to students.

Since the donor as well as the administration of Bradley Institute have a common desire to make the Bennett Collection, supplemented by the already extensive library facilities in industrial education and related fields, serve in the most helpful manner possible, the following plans for housing and use have been developed. The Bennett Collection will be housed in a room by itself adjoining the main library in Bradley Hall. It is also most appropriate, from a sentimental point of view that the bookcases of quarter oak were designed under Mr. Bennett's direction when the Institute began its work in 1897. The librarian, Miss Lillian Guinn, and her staff, have given much time and care to the placing of material on the shelves with Mr. Bennett's suggestions as to grouping. In caring for the material, all pamphlets, reports, and clippings have been placed in standard pamphlet boxes. Through NYA assistance, a complete inventory is being made to provide an index for consultation as well as a listing on each box as to its contents. Some of the older books cannot be rebound, but will be otherwise preserved, others will be repaired and rebound as the need arises. From time to time it is expected that additions may be made through gifts or purchase.

In the matter of use, students at Bradley preparing as teachers of industrial arts, art, vocational education or home economics, as well as others, may study materials in the collection as their work proceeds. Graduate students in other colleges and universities are cordially invited to make use of the collection in their research projects. The only steps necessary will be to secure approval of their deans or advisers for such study. This official may communicate with the institute librarian or the writer indicating the nature of the research project, the type of reference material desired and the most convenient time for such study. The room has table space, chairs and adequate lighting for study under good conditions. The library staff will assist in locating desired references. No charge will be made for such service. In some instances, books may be borrowed through the interlibrary loan, however, the majority of the material is of such a nature that this plan of use will not be possible.

The collection has been arranged under twenty-nine groups. The relative strength of each group is evident from a study of the following outline indicating the number of books, pamphlets, and mimeographed or oversize items. Inquiries from those interested in further details will be welcomed.

THE CHARLES A. BENNETT COLLECTION
Bradley Polytechnic Institute Library

Group No.	*Group Title*	*Books*	*Pamphlets*
1	Europe — *Educational Theory before Pestalozzi* According to Nature, Relation of Thoughts to Things, Industries, Guilds Rousseau, Comenius, Locke, Montaigne, Milton, and others	21	9
2	Europe and America — *Pestalozzi and His Influence* Learning by Doing, Object Teaching, Kindergarten, Manual Labor Schools, Agricultural Schools Pestalozzi, Fellenberg, Wehrli, Froebel, Owen, Krusi, Alcott, Sheldon, and others	25	11
3	Europe — *Art and Art Education before the World's Fair in 1851* Apprenticeship, Schools of Art, Practical Design, Royal Academy, Drawing Books Richardson, Reynolds, Wornum, Opie, Fuseli, Walpole, Smith, Goodyear	29	6
4	England — *Education of Workingmen and the Poor* Mechanics Institutes, Workingmen's College, Ragged Schools, Reform Schools, Industrial Schools Shaftsbury, Brougham, Birkbeck, Maurice, Falk, Guthrie, Demetz, and others	14	9
5	America — *Industrial Education before the Centennial Exposition of 1876* Servitude, Apprenticeship, Mechanics Institutes, Schools for Orphans, Negroes, Indians, Agricultural and Mechanical Colleges, Trade Schools Turner, Morrill, Armstrong, Wilder, Herrick, and others	28	34
6	Sweden, France, Germany — *Manual Training* Sloyd, Hobelbankarbeit, Travail Manual Salomon, Goetze, Pabst, LeBlanc, Salicis, and others	25	61
7	England — *Manual Training* Sloyd, Educational Handwork, Handicraft Barter, Binns, Judd, Cooke, Boxall, Graham, Pearson, Ballard, Horth, Bailey	62	320
8	America — Manual Training — Early Period Discussion, Reports, Textbooks, Associations, Teacher Training Runkle, Woodward, Ham, Love, Walker, Belfield	46	157
9	Europe — *Technical, Trade, and Art Education after the World's Fair in London in 1851* Report of the Royal Commission, Technical Schools, Continuation Schools, Polytechnics, Schools of Industrial Art, Trade Schools Kerschensteiner, Magnus, Hogg, Mather, Teegan, Millis, Diderot, Della Vos, Vaughan, Haney, Saller	24	113
10	England and America — *Arts and Crafts Movement* Art in Industry, Craft Guilds, Arts and Crafts Exhibitions, Art and the Machine Ruskin, Morris, Crane, Lethaby, Ashbee, Walker, Whiting, Stickley, and others	40	137
11	British Dominions, South America and the Orient — *Manual, Industrial and Technical Education* Canada, Australia, Africa, India, Japan, Brazil, Argentina, Uruguay, Bolivia, Mexico	13	112
12	America — *Primary Industrial Arts. Elementary Handwork*	33	27

Group No.	Group Title	Books	Pamphlets
	Weaving, Basketry, Clay Modeling, Pottery, Paper Construction, Bookmaking, Cardboard Construction, Kite Craft, Sewing, Art Needlework, Knitting, Textile Study James, Rich, Cremius, Bean, Turner, Chamberlain, Todd, Sanford, Seegmiller, Dopp, Knapp, Buston, Trybom, Kenyon, Worst, Holland, Lester, Wilson, Miller		
13	America — *Manual Training, Manual Arts, and Industrial Arts after 1900* Discussions, Courses, Associations, Teacher Training, Surveys, etc. Richards, Griffith, Bawden, Haney, Leavitt, Bonser, Larsson, Selvidge, Roberts, Schweickhard, Crawshaw	71	92
14	America — *Vocational Education and Vocational Guidance* Discussions, Courses, Associations, Surveys, Teacher Training, Reports, Federal Board, etc. Richards, Prosser, Allen, Snedden, Cooley, Lee, Parsons	61	1,982
15	America — *Art and Art Education* Philosophy, History, Public School Courses, Design, Landscaping, Museums, Artists, Teacher Training, Arts Schools, etc. Bartholomew, Smith, Dow, Bailey, Sargent, Hall, LaFarge, Snow, Froehlich, Cross, Ross, Haney, De Carmo, Batchelder, Parsons, Richards, Frankl, Winslow, Whitford, Farnum, Henri, Sturgis, Boas, Cox, Cram, Van Kyke, and many others	106	516
16	America — *Education of Women for Homemaking and for Vocations* Homemaking, Foods, Clothing, Textiles, Teacher Training, Training for Industries, Commercial Training, White House Conference Richards, Kedzie, Bevier, Justin, Abbott, Bailey, Cook, Woolman, Josserand, and others	31	204
17	*History and Philosophy of Education* Changes in Philosophy, The Teacher, Moral Education, Social Education, Practical Arts, Art Education Dewey, Davidson, Jacks, Monroe, Palmer, Eliot, Kilpatrick, Kandel, Bailey, Smith, Sisson, Harris, etc.	62	159
18	*Educational Psychology and Methods of Education* The Educative Process, Tests, Principles, Aims, Essentials of Method, Activities, etc. Hall, Dewey, James, Baldwin, DeGarmo, McMurry, Thorndike, Hopkins, Parker, and others	45	79
19	America — *General Education — Especially in Public Schools* Administration, Secondary Schools, Elementary Schools, Rural Schools, Adult Education Surveys, Parent-Teacher Associations, Teacher Training, Health Education Judd, Ayres, Bobitt, Hanus, Studebaker, Zook, and others	37	487
20	*Drawing and Painting Technique* Freehand Drawing, Perspective, Landscape, Etching, Water Color Painting, Oil Painting Smith, Ruskin, Whitlock, Viollet-le-Duc, Harrison, Frederick, Hubbard, Norton, Koch, etc.	21	6
21	*Architecture and Architectural Drawing* History of Architecture, Better Homes, Architectural Composition, The Orders, the New Architecture Cram, Bragdon, Fletcher, Hamilin, Roberston, Longfellow, Sturgis, Elwood	26	62
22	*Mechanical Drawing* Elementary Instruction, Machine Drawing, Descriptive Geometry, Lettering, Standards and Conventions Minifie, Reinhardt, Leeds, French, Mathewson, Berg, Anthony, Kepler, and others	43	85
23	*The Art Crafts — Technique and Design* Wood Carving, Sculpture, Clay Modeling, Pottery, Weaving, Needlework, Basketry, Jewelry, Art Metalwork, etc. Rowe, Rose, Partridge, Cox, Day, Googerty, James, Varnum, Whitford, Dabrowski, Grueby, and others	31	60
24	*Woodworking* Elementary Benchwork, Sloyd, Joinery, Furniture, Pattern Making, Wood, Lumber, Forestry, Upholstery, Carpentry, Wood Finishing Griffith, Roberts, Tustison, Noyes, Larsson, Gregory, Hooper, Goss, Roehl	49	232
25	*Metalworking, Machinery, and Electrical Construction* Sheet-metal work, Blacksmithing, Foundry Work, Machine Construction, Automotive Repair, Metal Spinning, Farm Mechanics, Radio, History of Tools, Aircraft, Steel, etc. Barnard, Rose, Willoughby, Bessemer, Silmeus, Diesel, Firestone, Ford, Edison	22	62
26	*Printing, Engraving, and Bookbinding* Typography, Composition, Display, History of Printing, English for Printers, The Binding of Books, etc. Dockrell, Davenport, McMurtrie, Polk, Woodbury, Donnelley, The Typothetae, and others	22	328
27	*Research, Writing, and Publishing* Technique of Research, Writing History, Short Story Writing, Publishing, English Composition, Criticism, The Writing of Textbooks, Editing Crawford, Fling, Hockett, Grabo, Unwin, Wendell, Jones, Frederick, and others	18	17
28	*Miscellaneous* Social Science, Economics, Industrial History, Industrial Geography, Biography, History of Labor Organizations, Agriculture, Thrift, etc. Carver, Coman, Smith, Lynd, Smiles, Commons, Day, Blodgett, and others	29	71
29	*Encyclopedias and Dictionaries* Keddle & Schem — The Cyclopaedia of Education, Watson — The Encyclopaedia and Dictionary of Education (4 volumes) U. S. Census, 1900 — Statistical Atlas	6	
	Totals	1,040	6,266

Mechanical Drawing

M. R. Klein

Nathan Hale Junior High School, Cleveland, Ohio

Most people express their thoughts by means of either the spoken word or the written word. By using the English language we are able to understand the meaning expressed by other people. Should we try to describe with words, however, the construction of a home in detail, the building of a bridge, the manufacture of an automobile, we find the task almost impossible. It is then that we make use of the "Language of Industry," namely, drawing. We find in all phases of industry various kinds of pictures, graphs, and drawings being used.

Photographs portray usually a perspective of an object. They present general *eye* pictures. A photograph of a house presents an illustration from an outer appearance only. The photograph does not show the true dimensions of the house, nor does it show the exact construction. It would be impossible to build a home using the photograph as a guide. Likewise it would be impossible to construct a machine such as an automobile if guided only by a picture sketch. Such a sketch usually drawn in perspective presents only a view as seen by the eye.

An accurate form of description has been evolved by which the true shape and size of each detail may be illustrated. This is done by means of various views of an object drawn according to a definite manner with various kinds of lines and figures to indicate the sizes. This type of illustration is known as mechanical drawing, really a universal language of industry. By a simple method of reproduction mechanical drawings are usually blueprinted. Any number of blueprints may be made from the original tracing of the drawing.

Accurate blueprints of neatly drawn objects assist the workman in reproducing the articles that are shown on the drawings. The draftsman, however, must first do *his* work accurately, neatly, and with some speed.

Errors in workmanship are reduced when lines are correctly drawn, when the object is accurately drawn to scale, when proper notations are made and when details such as dimensions are correct. Simple single-stroke lettering neatly executed not only adds to the appearance of a drawing but lessens the chance of making errors in reading the drawing by the workman, who is to work from it.

Equipping the School Print Shop Economically

Clifton Resch

Central High School,
Grand Forks, North Dakota

There are two sides to every question, and it is reasonable to believe that you will ask, What is economy? Economy is a word having a "split personality": real economy and false economy. Webster says that economy implies thrifty administration; then conversely, false economy would infer an administration that did not function in a businesslike manner. From this definition it is obvious that we cannot measure the thrift or economy of any school administration by the amount of money expended. The real or true economy of school-shop equipment cannot be judged by the first cost of the equipment. Two other factors must be considered: (1) cost of maintenance, and (2) the returns that are realized from the equipment.

Too often the word *economy* is used as a synonym for "cheap," "low cost," or "low priced." Webster makes no such comparison. He says only that economy implies thrifty administration. Logically speaking then, an expenditure of four thousand dollars that brings real, tangible, definite returns may be much more economical than an expenditure of two thousand dollars that brings only questionable returns. *Returns on school-shop equipment cannot be measured entirely in terms of dollars and cents* any more than you can place a monetary value on friendship. It is conservative and reasonable to say that the two-thousand-dollar program may be far more expensive than the four-thousand-dollar program.

It is on this basis that we are justified in saying that the school print-shop equipment in the public junior and senior high schools should be real "he-man" equipment. Of course, we would not advocate five-hundred-dollar proof presses or two-thousand-dollar automatic units; neither can we justify the purchase price, regardless how small, for toy presses and card cutters to take the place of small platen presses and a workable hand-lever paper cutter.

Every child of school age has an elementary idea that printing is done by putting ink on type and stamping it on paper. If the equipment is to be so limited that the student is restricted to just that, we might better call it an art class and strive for greater activity on the part of the student. (Activity here is used as a sugar-coated term to replace that time-worn expression, "busy work.")

It is unimportant that every two or three boys have a toy press and a card cutter and complete some insignificant piece of work every day. There is too much emphasis on quantity; quality is deserving of much more consideration than it is ordinarily given. It would be more reasonable to direct the students to produce only one piece of high quality work in one, two, or even three weeks. This can only be done in a shop that is well equipped with the smaller sizes of the same equipment used in industry.

A craftsman could not do good work on some of the present-day school printing equipment. How can an inexperienced student do creditable work, since he must necessarily use the work produced by the craftsman as his standard? Not that he will approach it; that would be expecting the impossible, but admitted or not, there is bound to be that comparison. By selecting the type of work to be done and providing the student with a properly equipped laboratory, it is quite probable that they can turn out simple forms that are neatly printed and present a pleasing appearance.

Some will advance the reason that since the equipment is limited and somewhat inefficient, the student will have to work just that much harder and will develop perseverance. This may be answered by quoting the old truism, "Nothing succeeds like success." If reasonable effort cannot turn out good work because of the poor equipment, the student will develop the "don't care" attitude, which is a long way from being desirable.

When the question of print-shop needs comes to the attention of the administrator it is quite probable he will take this attitude, especially if the request is made in the way of an apology. "I question the wisdom of making a large expenditure for the printing course, and apparently the instructor does too, because he is willing to get by with a skeleton outfit. Since the expense is comparatively small we might as well go ahead." Many printing teachers are responsible for this state of affairs. If requests for equipment are put forth in a businesslike manner, and the request carries the assurance that the instructor knows what he needs and is asking for that and nothing more, more often than not the request will be granted. Any instructor who thinks printing has so little to offer that he must get along with next to nothing to justify its existence on a dollar and cents basis is incapable of making a real contribution to the field of printing education.

Compromise is commendable and is necessary in some situations. Indeed, in some poor school districts a small shop of miniature equipment might be all that could reasonably be expected. However, in the same school the cooking class should then be expected to get along with 98-cent hot plates, the sewing class to be using doll sewing machines, the chemistry class to be using discarded light bulbs for flasks, and the typing classes to be using the miniature Christmas edition of the real typewriter. *Any course that is justified in our public schools is worthy of good equipment which permits the course to be properly taught.*

Cheapness does not necessarily spell economy.

The physics department in any school probably will have a galvanometer, ammeter, or other single pieces of equipment that cost from 10 to 50 dollars and are used only a few days each year. But no physics teacher will say "We would like to have this instrument, but it costs 50 dollars and we can get one that will measure the same thing, although not as accurately, for $3.95 so maybe we better take the cheap one." More likely he would say "We need this galvanometer," and he usually gets it, because his very attitude speaks assurance and he has the courage of his conviction. Printing instructors would do well to emulate the science teachers in this respect.

Some who would advocate miniature letter-press equipment would also like to have an offset. Consistency seems somewhat lacking in this line of thought. It is impossible to teach the offset in the industrial-arts courses in printing in our public junior and senior high schools, because the additional problems involved are beyond the grasp of the mind of the pupils. The echo of that statement comes back like this; "Chemicals can be purchased prepared; plates can be furnished by a commercial plate maker. All we have to do is put the plate on the press and throw the switch." Apparently some would like to make robots of the students.

Often the reason for wanting an offset is to do production work for the school offices. Why not make a better investment in letter-press equipment and have some of the work done as regular shop exercise? Offset is definitely a part of the printing industry and should not be neglected. It can best be taught by demonstration and a visit to a plant having one in operation under the supervision of a competent pressman.

Because printing does have a rightful and accepted place in the educational program, printing instructors are not only justified in asking for good equipment, but it becomes a part of their task to see that the "Art preservative of all art" is taught in a well-equipped laboratory. Then too, they should remember that the knowledge and resources of the educational departments of printing-equipment organizations is at their service for the asking.

The Real Industrial-Arts Teacher

H. H. Robinson

Senior High School,
Augusta, Kansas

Perhaps in no other profession must the beginner assume full responsibility for his work so abruptly and completely as in teaching. It is understood that the young engineering graduate is not more than half way along the route to full responsibility. The beginning teacher must almost universally shoulder a full load at his initiation. Indeed, the load is so heavy for the beginner that the less capable often rely upon their meager store of information and background gained in college. The teachers of the trades and arts have especially been warned against the fatal and omnipresent temptation of resting on their oars. We have repeatedly been admonished (and certainly for good reason) against becoming narrow tradesmen. The better peoples of all walks of life are ever growing in their interests in the social, political, spiritual, and economical ramifications of the human race. What group or profession needs a wide, sound perspective more than the leaders of youth? This truth seems too apparent to need very much discussion.

While we are constantly being urged to grow into enlightened and cultured citizens of this complex society, we also need encouragement to become fine artisans and artists in our teaching fields. Surely we need a vital and growing philosophy of life and education, but we must also work to be master craftsmen.

Perhaps the outstanding reason why many teachers are not skilled in the arts and trades that they are attempting to teach is that they really do not realize their deficiency. In almost all fields of human endeavor it might be said that a person is a very poor judge of his own ability and accomplishment. It has been proved by scientific experiments that the poorest performers are the poorest self-judges. They almost uniformly overrate themselves.

If the reader be a teacher of some experience and will frankly answer the following questions, he might be helped some in evaluating his own skills.

1. Have I gained the most important part of what I now know about my art or trade from the few related college courses that I have taken?
2. Do I still exhibit the work that I did in my college classes as my best creation?

If one must answer these self-administered questions in the affirmative, it seems very doubtful, if not impossible, that he can truly be a skilled craftsman.

Have we, young teacher and old, ever competed with journeymen and master craftsmen in our fields? If this experience has not been ours, it seems likely that we do not possess a genuine criteria for estimating our own performances. The best workmen, who of necessity are keen observers, are the ones who realize their needs and continue to improve. The thought of a backwoods philosopher applies here: "Them that has, gits more."

The instructor of drafting who has never produced working drawings in some industry (drawings that guide in the investment of thousands of dollars) most certainly does not and cannot have any full conception of the practical applications of the "language of industry." Such trade terms as *checking* and *commercial practices* just cannot carry significant connotations to the inexperienced. While industrial drafting experience is not available to most teachers because of their lack of engineering background, real workaday experience is open to the aggressive teacher in most of the trades and arts taught in schools.

Surely it is a great benefit to any teacher to be a good artist or artisan in his teaching field. Some of these benefits merit at least brief discussion.

The boys and girls who enter our shops are perhaps carried to success or failure as much by their attitudes as by all other influences combined. Experienced, observing teachers, know that those with a background of successful creative experience, and the resulting self-confidence, have good roots for rapid, healthy growth. In fact, has not one of the strong arguments for the support of our own teaching been that self-confidence grows when work is successfully done?

The teacher also needs a substantial footing on self-confidence. If the confidence be intelligent and justifiable, one of its prerequisites must be the skill of a masterful workman. The teacher who has the very feel of the finest operations in his finger tips, has one of the essentials of a good teacher and will be able to demonstrate with ease, accuracy, and self-confidence.

The instructor who is a good workman has an important advantage in gaining the respect of his students, patrons, and artisans of the community. Do we not all admire those who can do things with finesse? Someone has said, "The finest eloquence is to get things done." Do our pupils see the work of our hands about our shop, in the process of making — work that inspires them to finer effort? Do they see it grow from week to week? Do our former students drop in occasionally to see what new *masterpiece* may be coming from the mind and hand of the teacher?

Much fine artistry is being produced by the hobby riders. What we are teaching might well be made our creative hobby, at least until a high degree of skill is gained. The fact that a hobby must be a pleasant diversion from one's daily task, does not eliminate this possibility, for there is a great difference between guiding young people in classwork and working for one's own delight in creative effort.

Those of our profession who are really leading youth to know the joy of work and accomplishment must surely be those who themselves know that joy and continue to experience it. It seems that it would be un-

Products of a skilled teacher's hand

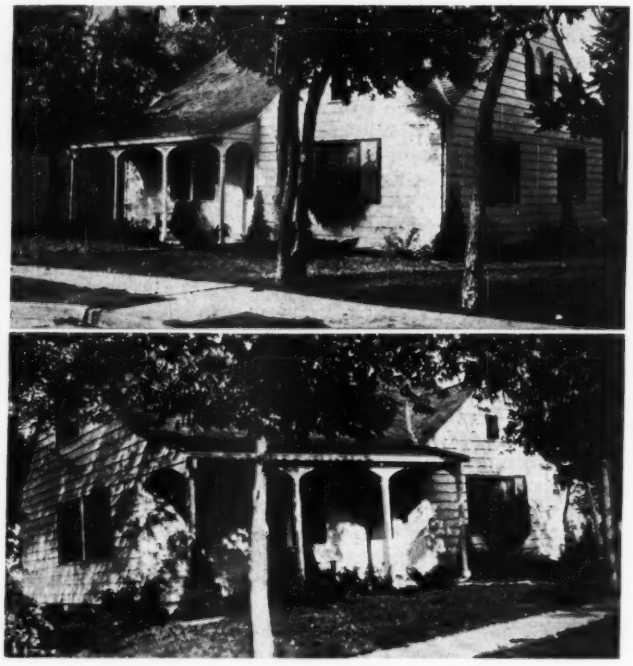
fortunate for any young learner to be under the direction of any teacher who has not mastered his own work sufficiently to have gained real enthusiasm for it and found joy in it. One is reminded of Mr. Coolidge's thought on this subject which essentially is this: Show me a man who does not like to work and I will show you a man who has not learned how to work. Confucius expressed a similar thought long ago: If a task is hard to do, you do it the wrong way.

Much good-looking work is turned out of our school shops by putterers. Much creditable work is done in an uncreditable manner. Who has not seen classes spending weeks upon projects that should be made in days? The instructor who can do a workmanlike task on a craftsman's time schedule should have some idea of how to teach boys and girls to become real accomplishers — how to gain that wonderful knack of getting an hour's work done in one hour. If the teacher has had but a little trial experience in college, surely he must admit that skill and speed is far from being his. The puttering workman has no basis for teaching fine accomplishment to youth. The workman who must take two hours to do one hour's work is but half a workman. While the fine artisan or artist may be a very poor teacher he at least has one indispensable requirement — skill.

There are but few born naturals in athletics and probably just as few in the arts and crafts. Without intensive and extensive work experience, a great majority of us can never gain much skill. The puttering instructor may see that good work is turned out but has little chance of developing good workmen.

It is, indeed, a challenging undertaking to attempt to guide young people into the joy of fine accomplishment. This is especially true in these days when the youth has but little opportunity of learning to work.

There are but few outstanding masters of any of the trades, crafts, or professions. There is one field of human endeavor in which all who will succeed must strive to be masters. That is the field of *teaching!*



The house that an industrial-arts teacher built

Problems and Projects

18-IN. TWIN-DISK SANDER

W. A. DeVette, Technical High School, Erie, Pennsylvania

(For assembly and detail sheet 1, see next page and page 413. Detail sheets 2 and 3 will appear in the January issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.)

A Unit Problem in Drafting

This machine was originally designed in the Smith-Hughes classes of the writer at the request of the patternmaking instructor who needed such a machine in his shop. The patterns were made in his classes, the castings by a local foundry, and the machining in our own school machine shops. The completed machine has been in service for over two years.

Its value as a drafting project, however, was too great to let the drawings die a natural death in the files. They were resurrected and turned into perspectives as shown in the illustrations. They are now a permanent part of the drafting course.

At the proper time in the course the instructor divides the class into squads and selects a *chief draftsman* for each squad. These chief draftsmen then pick their men by the time-honored method of choosing sides.

Each chief makes his own assembly drawing and assigns the details to the members of his squad. When the details begin to come in, he may designate one man as *checker*.

Much desirable rivalry can be developed during the progress of the work. A sense of responsibility follows. The necessity for leadership and followership becomes evident to all members of the class and methods of *drafting-room practice* are learned by experience.

When the pencil drawings have been completed, each member of the class may be assigned his share of the tracing if the instructor thinks this advisable.

This method of class instruction does not make the work of the instructor any easier, as it involves increased individual instruction as regards proper scale, selection of views, method of dimensioning, and the like. However, the work becomes much more interesting and the results are well worth the effort.

RECONDITIONING PENCIL SHARPENERS

R. E. Murray, Fremont Ross High School, Fremont, Ohio

To replace worn-out pencil sharpeners in a large school system costs money. This article shows how they may be reconditioned without much trouble so that they will serve at least twice as long as they would if no attention were given them. Besides, the reconditioning serves as an excellent shop project.

Method of Procedure

1. Remove the cutters from the machine. See Figure 1.
2. Remove the pinions from the cutters but keep the pinion and the cutter from which

(Continued on page 415)

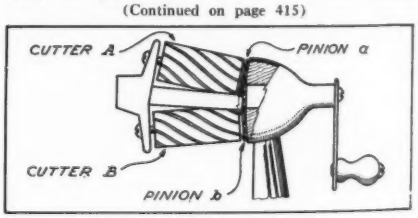


Fig. 1

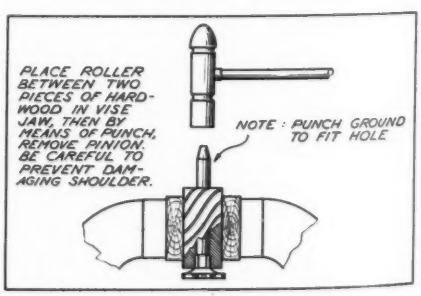
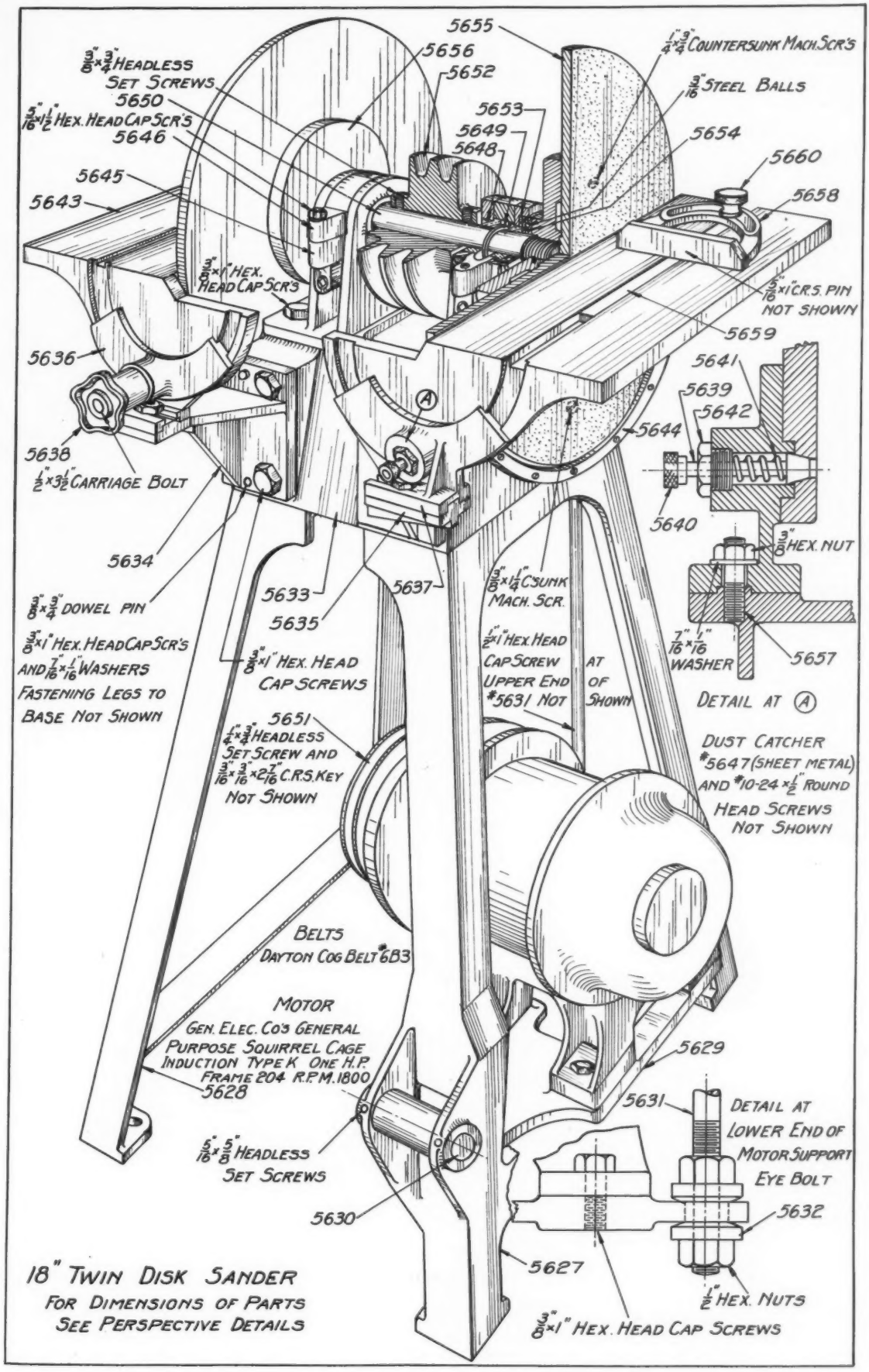
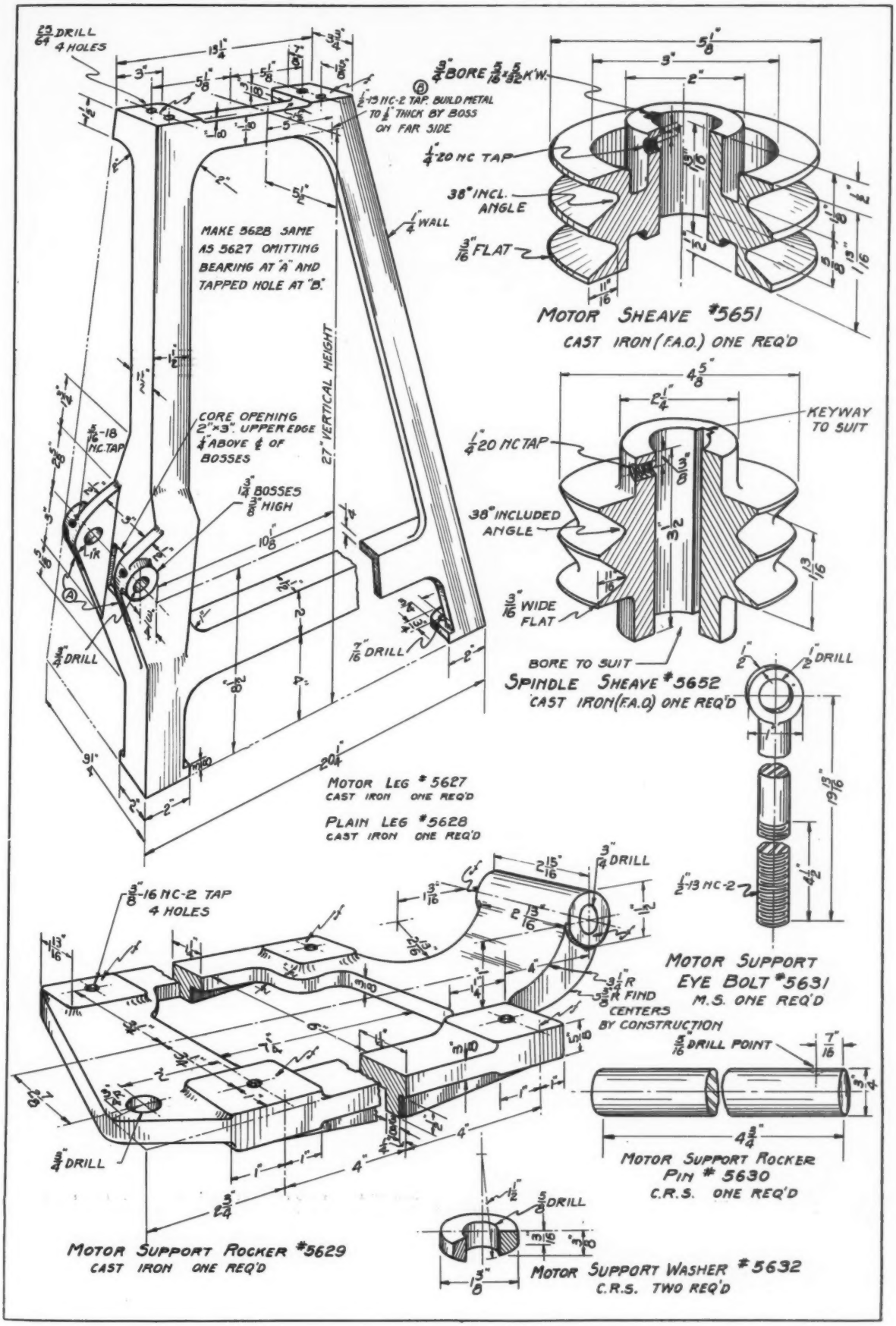

PLACE ROLLER BETWEEN TWO PIECES OF HARD-WOOD IN VISE JAW, THEN BY MEANS OF PUNCH, REMOVE PINION. BE CAREFUL TO PREVENT DAM-AGING SHOULDER.
NOTE : PUNCH GROUND TO FIT HOLE

Fig. 2



Assembly of 18-in. twin disk sander submitted by W. A. DeVette, Technical High School, Erie, Pennsylvania


MOTOR SHEAVE #5651
CAST IRON (F.A.O.) ONE REQ'D
KEYWAY TO SUIT
38° INCL. ANGLE
BORE TO SUIT
SPINDLE SHEAVE #5652
CAST IRON (F.A.O.) ONE REQ'D
MAKE 5628 SAME AS 5627 OMITTING BEARING AT "A" AND TAPPED HOLE AT "B"
CORE OPENING 2"×3" UPPER EDGE 1/4" ABOVE ℄ OF BOSSES
27" VERTICAL HEIGHT
MOTOR LEG #5627
CAST IRON ONE REQ'D
PLAIN LEG #5628
CAST IRON ONE REQ'D
MOTOR SUPPORT EYE BOLT #5631
M.S. ONE REQ'D
MOTOR SUPPORT ROCKER #5629
CAST IRON ONE REQ'D
MOTOR SUPPORT ROCKER PIN #5630
C.R.S. ONE REQ'D
MOTOR SUPPORT WASHER #5632
C.R.S. TWO REQ'D

18-in. twin disk sander. Detail sheet No. 1 by W. A. DeVette

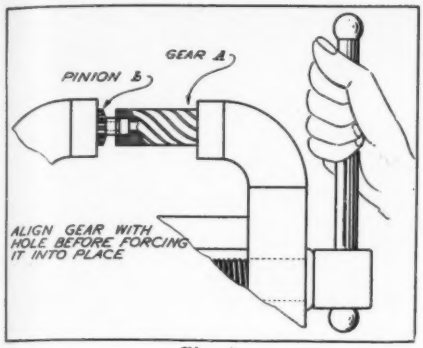


Fig. 3

(Continued from page 410)

it came, together. Figure 2 shows how to remove the pinions.

3. Now force the pinion taken from say cutter *A*, into cutter *B*. Likewise force the pinion taken out of cutter *B*, into cutter *A*. If no arbor press is available, the vise may be used for forcing the pinions into the cutters. See Figure 3.

4. Reassemble the parts and oil them. Place a card on the reconditioned sharpener which reads as follows: "to sharpen pencil, turn handle counterclockwise."

CLAMPING AID

F. W. Dejmek, Vocational School, Marinette, Wisconsin

Clamping curved feet to a post can be easily and more efficiently accomplished by cutting a slot in one clamp jaw as shown in Figure 1. When clamping three feet to a post, a clamp having only one slotted jaw will serve the purpose, but when four feet are to be glued, then a clamp having two slotted jaws will be required. Then two feet can be glued in one clamping by using only three hand screws.

It is necessary to make the jaws at least two inches longer in order to be able to apply the pressure at the right place when clamping the various curved feet that are used. The thickness of the jaw should not be increased. The width of the jaw may be increased to strengthen it.

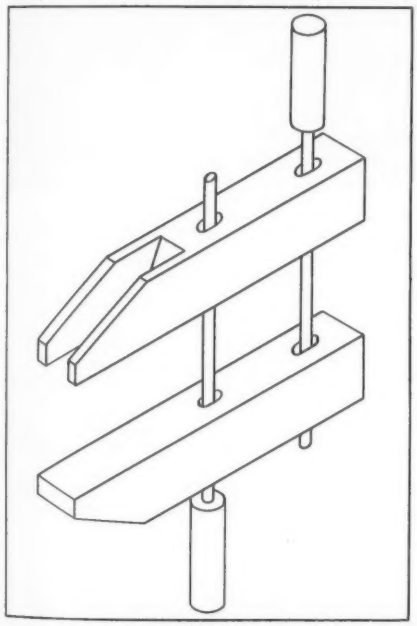


Fig. 1

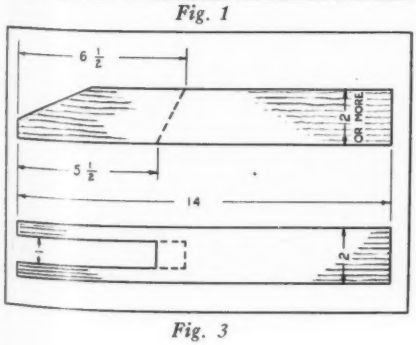


Fig. 3

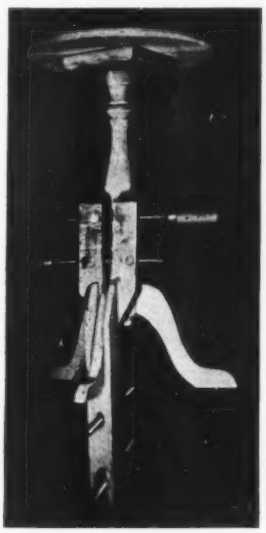


Fig. 2

By slanting the bottom of the slot, sharp curved feet may be clamped without difficulty.

No doubt many other occasions arise in shops where a clamp with slotted jaws will be of unusual value. The clamp is by no means limited to the special use that has just been suggested, because it still can be used as an ordinary clamp.

Figure 2 shows the clamp in use.

Figure 3 gives dimensions which the author has found useful in making the suggested changes on his clamps.

THE ART OF MOLDING

L. M. Rigelman, Portland, Michigan

The Flexible Mold

On page 284 of the September, 1938, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION there was described the piece-mold process of making statuary. While this process has been found to be the most practical for the school shop, not all articles can be molded by this method. Those who master the piece-mold process will, no doubt, want to enlarge the scope of their work to include all possibilities, therefore, this article will deal with the flexible mold. With this process all statuary, novelties, and lawn ornaments, can be made.

Material

There are many materials on the market today that can be used for making flexible molds. Their method of application differs with the material used. Some of them are sprayed on, some brushed on, others are vulcanized, and some are made of a synthetic rubber or composition. In these instructions, however, we will use gelatine glue as the mold substance. Except for permanence it has most of the qualities of the other materials mentioned, and is more reasonable in cost. Any good grade of gelatine glue will make molds. If care is taken, it can be used over and over again and the initial outlay for material will be but a few cents.

The Process

It is best for the beginner, in learning the flexible process, to start with a plaque or flat work. Such a piece will require only one shallow mold for reproduction. See Figures 1 and 2. As ability increases and knowledge of materials grows, one may proceed to more complicated articles.

The original plaque to be produced can be made of clay, wood, metal or most any material. The metal hammerings, wood carvings, etc., made in the shop can be reproduced in number and finished to nearly duplicate the original. School letters and insignia can be made into wall ornaments and sold to raise money for the club or class.

Having made or selected a plaque for molding, proceed step by step with the following instructions. If care is taken an exact replica of the original will be insured.

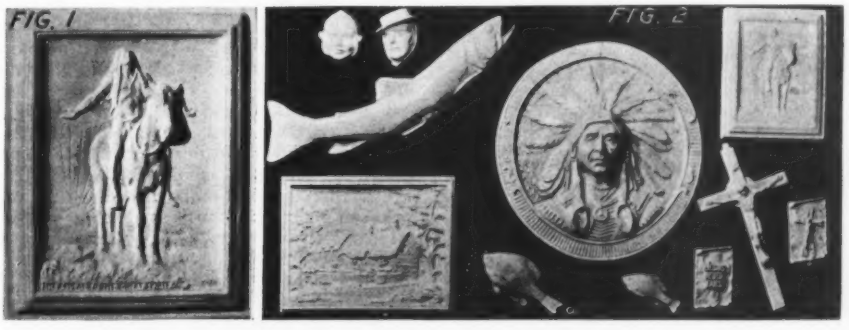
Materials Needed

1. Plaster of paris — a few pounds.
2. Gelatine glue — 3 or 4 pounds.
3. Alum — 2 oz.
4. Powdered chalk — a few ounces.
5. Stearine solution.

A stearine solution is made by dissolving stearine in kerosine to a creamy consistency.

Making the Mold

With all of the materials at hand, take the plaque which has been selected and grease it thoroughly but thinly with stearine solution or with sweet oil (Fig. 3) using a soft but firm brush. If the plaque is porous in nature it is best to shellac it before applying the



Examples of castings made from flexible molds

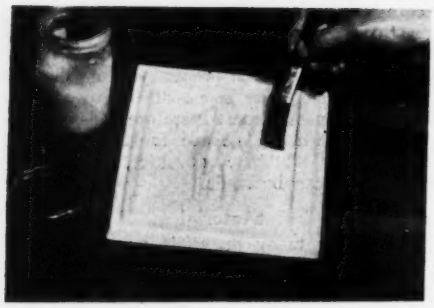


Fig. 3. Greasing the pattern

greasing solution. The purpose of the grease is to keep the glue from sticking to the plaque in the process of making the mold. If the greasing is not carefully done, it may cause damage to the original.

When certain that the plaque has been made impervious to the glue, place it on a solid surface in such a manner that the back of the plaque lies perfectly flat. Out of strips of wood or tin about 2 in. wide build a wall around it as shown in Figure 4. Please note how a wall of any size can be made from

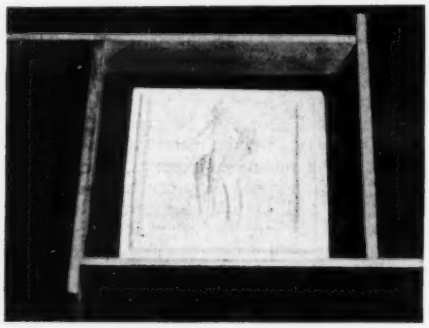


Fig. 4. Building up the flask

strips of wood. If care is taken these strips will not need to be nailed together, unless the plaque requires very deep walls. Instead, they can be secured with pieces of clay or brick. Be sure, however, that the joints are tight. If the strips are of porous material it is best also to grease them with the stearine solution.

The plaque is then ready to be molded.

Take a good grade of gelatine glue and after estimating the amount needed place in the gluepot. If the gluepot is too small, a double boiler may be made out of two pails of different sizes. Be sure, however, that the bottom of the inner pail is held off the bottom of the outer pail. Glue should not be overheated. In a double boiler, it never reaches a higher temperature than that of the boiling

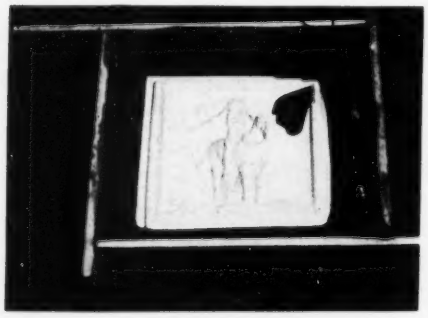


Fig. 5. Starting to pour on glue

water. Since most of the glue comes in flake form, shake the container so that the individual pieces will lay as closely together as possible. Then pour water into the glue until it is barely covered. Melt it over a moderate heat that will merely bring the water in the boiler to the boiling point. Overheated glue seems to lose its flexibility.

When the flakes are entirely melted remove the double boiler from the fire and let cool. Stir the glue frequently to insure an even cooking temperature and when it has reached a point that it feels neither hot nor cool to the touch it is ready to pour over the plaque.

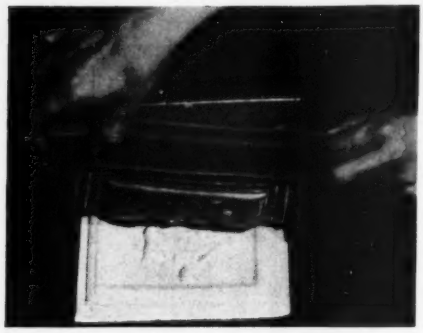


Fig. 6. Removing the mold from the pattern

See Figure 5. To hasten the cooling, take the glue pail out of the boiler, stirring the glue often. When the glue is poured too hot it may stick to the plaque. When poured too cool it will not flow into the details of the original, and the air bubbles will not escape properly to the surface. The glue is ready for pouring when the heat of the glue can be borne on the fingers without discomfort.

Do not pour the glue too fast but with a gentle flow let it work its way over the entire surface. This will let the air bubbles escape as the mold is being formed. Maintain this

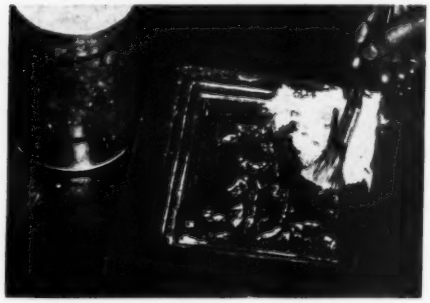


Fig. 7. Applying the powdered chalk

gentle flow of the glue until the highest point of the plaque is covered at least one half inch deep. Without disturbing let the new mold cool for at least three or four hours, depending on the temperature of the room.

When the glue has completely jellied so that it resembles rubber, remove the strips which formed the wall and carefully lift the mold from the original plaque, as shown in Figure 6. Turn the mold over immediately into an inverted position as in Figure 7. If the inside of the mold is as hard as the outside, proceed with the next step, if not let it harden a little longer in this inverted position.

It is well to remember that setting of plaster of paris generates a certain amount of heat. It is often the sad experience of amateurs to have their newly made mold

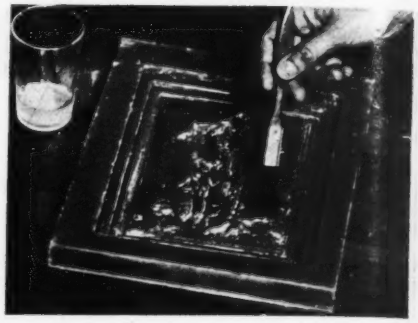


Fig. 8. Hardening the mold with alum water

melted by their first cast. If a number of casts are to be made, it is best to prepare the glue mold so that this will not occur. To do this, dust off the grease which adheres to the inside of the mold with powdered chalk. Place a little chalk in the mold and work it around gently with a soft brush as shown in Figure 7. When the grease has been removed, shake the remaining dust out of the mold and brush the surface freely with a solution of alum water as shown in Figure 8. This hardens the inside

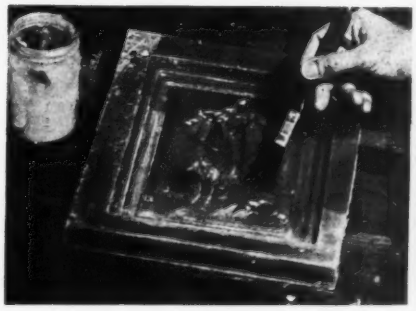


Fig. 9. Greasing the mold

of the mold. Alum water is prepared by boiling ½ oz. of alum in one cup of water. Use the solution while warm. When the surface of the mold is dry again, it is ready for the next step.

As a second precaution against this generated heat of setting, grease the inside of the mold with the stearine solution. In this there is a thin film that covers the surface of the mold that melts only with greater heat than the plaster can generate. This is applied as in Figure 9 and should be repeated for each cast made. Apply freely but not thickly to all the molded surface, where the plaster is likely to touch.

In mixing plaster, as already stated in the previous article, first estimate the amount of

Fig. 10. Mixing the plaster

Fig. 11. Filling the mold with plaster

water needed and then sift the plaster into the water until it forms an island that remains, as shown in Figure 10. Then let the plaster soak a few minutes and then stir. When it has assumed the consistency of very thick cream, pour it into the mold. Pat it gently for some time so that the air works out and the plaster works into the small details of the mold. See Figure 11. When the mold is completely filled, level off the plaster and insert two small screw eyes or wire loops at the top, as shown in Figure 12. Place them deep

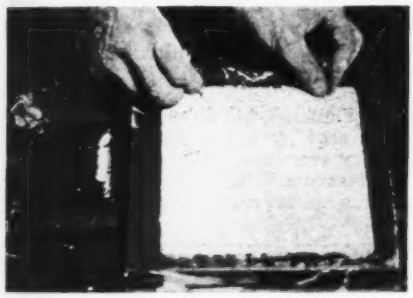


Fig. 12. Placing screw eyes in position

enough to barely come above the surface of the plaster. They can be carved open when the plaque is finished.

When the plaster becomes warm to the touch, it has set sufficiently that it may be removed from the mold, as shown in Figure 13. To do this, turn the casting so that the glue mold is at the top. Then gently loosen the rubberlike mold around the entire edge. If properly greased, the finished product will likely fall into the hand. Do not force too harshly. Be gentle and the casting will come out of the mold in perfect condition.

Figure 14 shows the complete plaque as

Fig. 13. Taking the cast out of the mold

it appears when first taken from the mold. You may scrape off the rough edges with a knife. Fill the air bubbles, if any, with some plaster scraped from the back of the plaque and build the plaster even with the surface and when dry it will not be noticed.

The plaques may be finished in any desired way such as described in the September issue. In addition, however, very attractive work may be done by painting in natural colors. To do this, it is best to give the dry plaque a thin coat of shellac and employ artist tube color as painting medium. When finished it can be given another coat of shellac or retouching varnish.

Fig. 14. The finished cast

The plaques may also be given an antique bronze finish. First shellac the dry cast then give two coats of high-grade bronze finish. When this has hardened shellac again thinly. Then with a wash made of turpentine and tube color, paint over the entire surface. While still wet wipe off the high spots with a dry, clean cloth. The color used depends entirely upon the desired effect. Antique bronze may be lighted with yellow ocher, copper with green, and silver with black. Other combinations may also be chosen that will be attractive.

A SIMPLE BOOKBINDING PROJECT

Merald K. Orth, Printing Instructor, Newburgh Free Academy, Newburgh, New York

Suitable for Junior- and Senior-High-School Classes

Industrial-arts teachers who follow the New York State recommendations for General Printing and Bookbinding will find this project acceptable either as a project for double-period pupils or as an outside-preparation project for single-period pupils. It has been approved by Mr. Fales of the State Department.

Removable Filler Cover

Tools: Paper cutter, ruler, pencil, paste brush, bone folder, book press, knife, 24-in. steel square.

Materials: For cover — 2 pieces No. 30 binder's board 5 by 8 in., 1 piece No. 30 binder's board ½ by 5 in., 1 piece pad backing board 5 by 6½ in., 1 piece book cloth 6½ by 18¼ in., 1 piece binder's cloth 4¾ by 16½ in.

For pad — 100 sheets newsprint 5 by 8 in., 1 piece binder's cloth 2 by 5 in., 1 piece backing board ½ by 5 in., 1 piece backing board 5 by 8 in., old newspapers cut so the sheets are free of each other, clean cloth for the hands, wax paper, and paste.

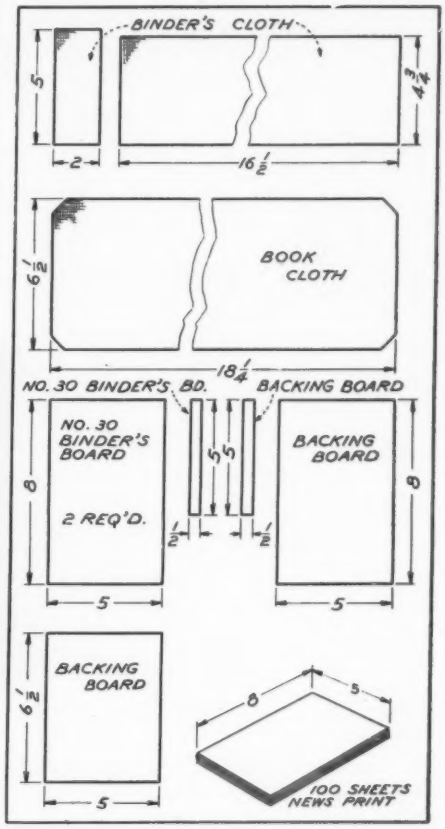


Fig. 1

This smaller piece of book cloth should be of a contrasting color. A cheaper grade of binder's cloth will be satisfactory.

Procedure: Place all the tools and materials necessary to do the job on the table where the work is going to be done. Put a large sheet of padding board on the table so as not to mar the surface. The scrap newspapers should be placed directly in front of the worker.

Lay out the sizes required on all the materials necessary. Use the steel square to insure correct measurements. Cut all pieces to size.

Lay the 6½ by 18¼-in. piece of book cloth face up on the table, lay out a ¾-in. margin along the sides and ends, and draw lines. From the lines on the ends, measure up 8 in. and connect the side lines at this point. From these lines, measure ⅛ in. and draw lines parallel to those just drawn. This will make the layout ready for testing the binder's board to see that there are no errors. See Figure 1, and make sure your layout looks like it.

Lay out the corners for binder's corners by measuring ¼ in. from the corner of the margins to the edge of the book cloth and place a mark there. Do this for all four corners.

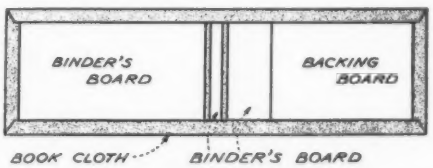


Fig. 2. Assembled and ready for pasting on binder's cloth

Through these marks draw a line making an equilateral triangle of the corners.

Cut the four corners on these lines.

Once again lay the book cloth face up on the scrap newspaper, and apply the paste to it.

Lay the binder's board on this to fit the places marked and press down firmly.

Lay the padding board over one end. *Do not paste it in any way.*

Draw the edges of the book cloth over the job the long way and rub down.

Do this on the other side.

Press the corners down and paste them. Clean hands with paste cloth.

Draw the ends over and rub down. Clean hands.

Turn the project over and rub out all air bubbles. Be sure the cloth is smooth on the boards.

Take the bone folder and crease between the large pieces on each end and the narrow piece in the center.

Turn over and leave face up in a handy position.

Now take the 4¾ by 16¾-in. piece of book cloth and put paste on the inside. Clean hands.

Place this on the inside of the project and rub down carefully.

Crease with a bone folder as you did the other side. Make sure this piece is creased carefully at the backing board.

Place in the book press flat or fold it over putting a half-inch board between. Put wax paper between the board and the project. (If folded, make sure the side with padding board is on the inside.)

Clamp down tight and allow to dry overnight.

While drying make the pad to be inserted as follows:

Pad in the regular way using flexible glue, cold padding composition, or cheesecloth and paste. Be sure the ½ by 5 in. is pasted on the padded end. The pad will be stronger if made by placing the ½ by 4¾ over the top of the stock and then running two stitches about 1 in. in from each end as shown in Figure 3.

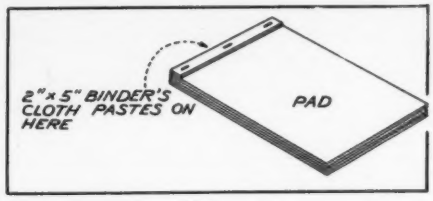


Fig. 3

Now paste the 2 by 5-in. piece of book cloth over the top of this pad and draw the end and under the back until tight and smooth. Rub until dry.

Trim pad to 4¾ by 7¾ in.

Remove cover from press.

Open carefully.

Insert knife in slot and cut underneath backing board carefully to each edge of the cover.

Insert board on back of pad and slide in.

Put title on cover with electric stylus, lettering pallet, or gold-stamping machine.

A GREATER USE FOR TRIANGLES

C. H. Niemann, Technical High School, Hammond, Indiana

The idea of simplifying the mechanics of drafting has been on the writer's mind for some time, with the result that the triangles herewith shown were produced from solid angles.

The procedure of making such a pair of angles was as follows: First the angles were drawn, traced, and a blueprint made. Then the angles were cut out from the blueprint and glued onto a piece of triangular plywood of the same size. Next, the triangle was placed between this and another piece of plywood and the three clamped to the drill-press table. The holes were then centered and drilled (through the first plywood and triangle).

The inches and divisions were cut with a safety-razor blade, held in a holder and tapped lightly with a small hammer. Finally, the sizes were stamped on, as shown and then the whole triangle was covered with red lead, in order to make the lines and figures more readable. After this was dry, the excess lead was removed.

The advantages claimed for these triangles, are (1) measurements can be made and the lines drawn at once; (2) the most commonly used sizes of radii and diameters can be drawn directly and thereby eliminate the chance of mismeasurement. A 1-in. diameter hole will be 1 in. and not ⅞ in. or 1⅛ in. as is sometimes the case; (3) a protractor is always available.

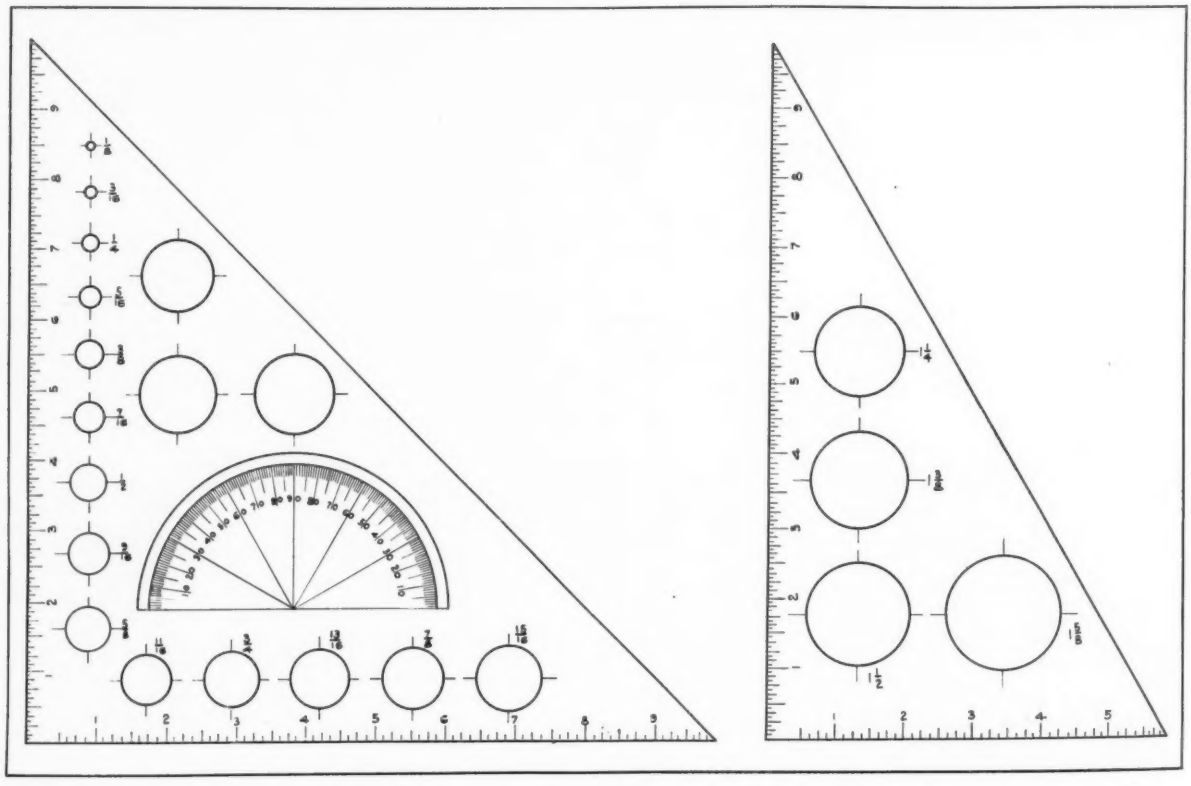
NOTE: The semicircular opening on the protractor was made by drilling small holes and finishing with a round file.

PROJECTOR TABLE

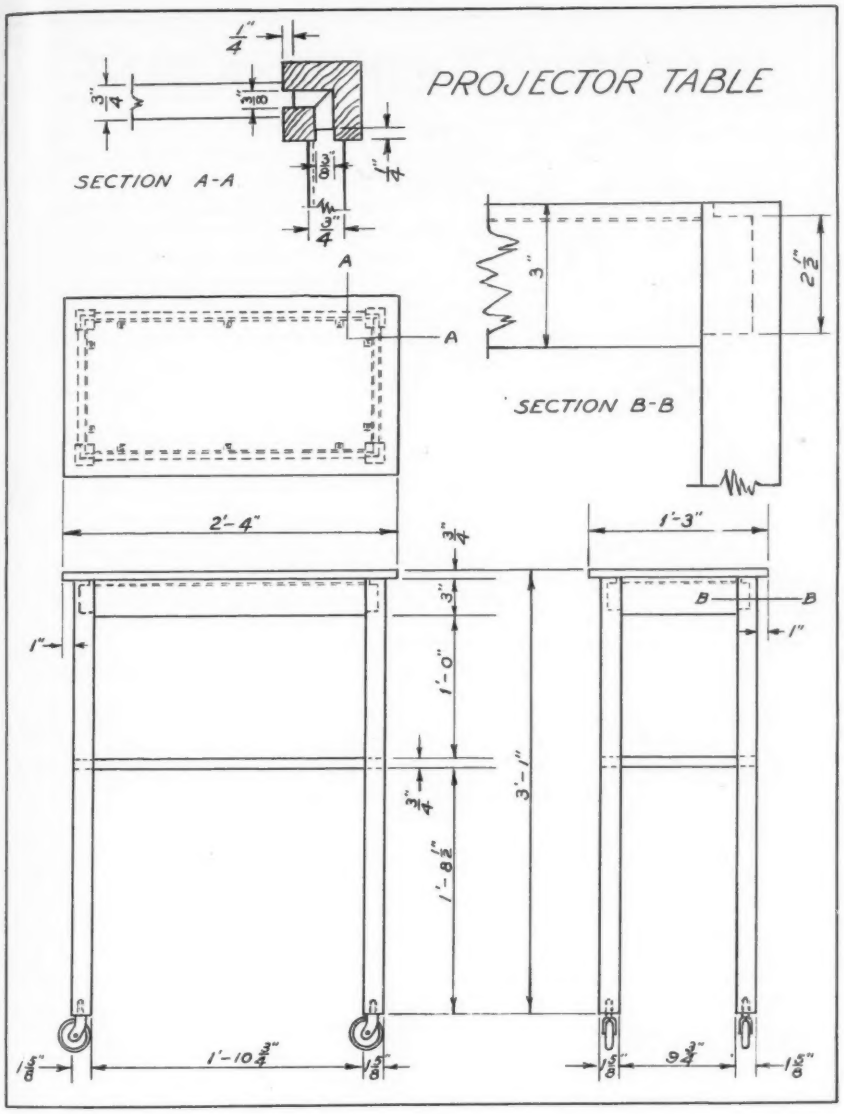
J. Perry Brett, High School, DuBois, Pennsylvania

The projector table described here was constructed for the audio-visual-aids department of the vocational woodworking division of the DuBois Public Schools, DuBois, Pa.

The need for such a table arose from the fact that every time a picture was to be shown in a classroom, it meant carrying 60 pounds of equipment from room to room.



Useful triangles. C. H. Niemann, Technical High School, Hammond, Ind.



The material used for the construction of this table is oak, although any suitable hardwood may be used. The drawing shows the various parts in detail. The table top is joined and secured to the rails by ½ in. by 1⅜-in. table-top fasteners. The fasteners are screwed to the table top and a saw kerf in the rails holds both in place. The legs are mounted on four casters, with 2¾ rubber wheels.

Oak being an open-grain wood, the table was finished with a paste filler, an oil stain, three coats of varnish rubbed down, and then given a coat of wax.

The table is large enough to accommodate a sound projector and phonograph turntable. The shelf beneath provides space for the speaker case, projector lid, film cases, and the like. The casters facilitate its mobility. The table is narrow enough to pass through the rows of seats in the classroom. Its height simplifies threading and operating the machine, and in directing the beam onto the screen. The table may be quickly pushed out of the way when not in use, and it will accommodate any type projector or lantern. It may also be used as a utility table by simply removing the casters.

WEDGE DRIVER FOR SMALL ELECTRIC-MOTOR WORK

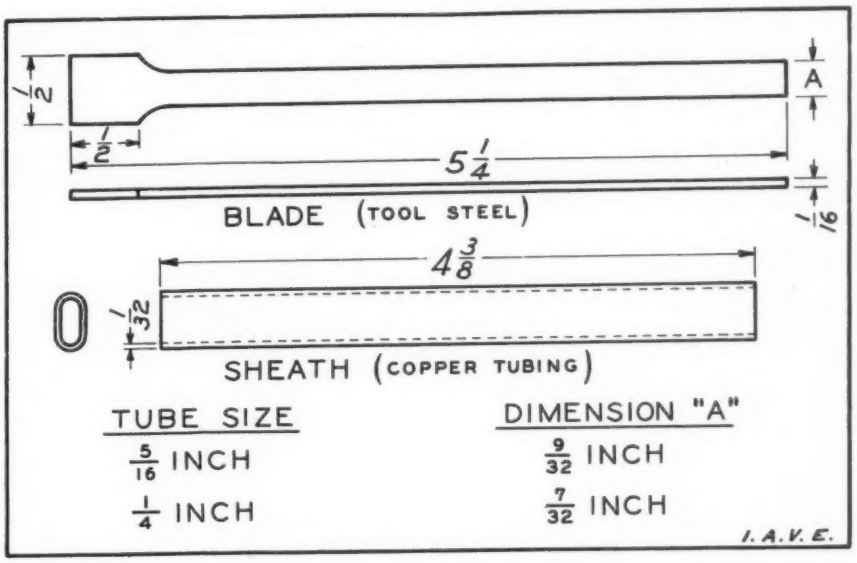
R. H. Theophilus, High School, Turtle Creek, Pennsylvania

A need has often been experienced for a wedge driver which is sufficiently small to drive wedges made of hard white or red fiber that is approximately 1/16 in. thick. Such wedge drivers may be made of copper tubing and power hack-saw blades.

The blade of the wedge driver is made first. A power hack-saw blade that is approximately 1/16 in. thick is ground to the dimensions shown in the drawing. The edges of the blade should be rounded slightly. Dimension *A* is 9/32 in. for a 5/16-in. copper tube and 7/32 in. for a ¼-in. tube.

The sheaths are next made of copper tubing which may be purchased in most automobile-accessory stores. The tubing is cut to length and flattened in a vise until the proper size of blade fits the sheath.

The wedge driver is used by placing the wedge to be driven in one end of the sheath, and the blade in the other. The wedge is then started in the proper slot and driven by lightly hammering the blade while holding the sheath. Care should be used to prevent the tearing of cell insulation while driving the wedge. This may be minimized by rounding the leading edge of the wedge and waxing it with paraffin.



Wedge driver for small electric motor work

SAFETY EDUCATION

Roy W. Schroeder, Instructor of Foundry Practice, Crane Technical High School, Chicago, Illinois

Yearly figures of accidents and deaths mounting to breath-taking totals makes us ponder the question, why?

When a doctor is called on a case he endeavors to trace it to its source. If a machine stops, the mechanic checks each part thoroughly to find out what caused the breakdown. Educators should become vitally interested in tracing to its source the cause of so much pain, loss of life, and money.

Good Housekeeping is Good Safety

Habits are the results of oft-repeated sayings or the doing of what seem to be insignificant acts. Learning to walk to the corner and crossing with the light if done regularly,

will become a valuable habit from the safety viewpoint. Picking up loose articles should become a habit of everyone, for little round articles or any small object could easily cause a turned ankle or more serious accident. "It is hard to teach an old dog new tricks." Ideas of safety should be inculcated into the minds of children at home and in every year of the child's life at school. The seeds of the safety habit, if planted when the child enters the first grade and are carefully nurtured through his school life will certainly pay big dividends at a time now recognized as being the most dangerous.

Our National Disgrace — Crippled Children

Fatal accidents, in fact, all types of accidents, show an alarming increase when the student is thrown on his own upon entering high school. We must come to the realization that our students of the teen age are under quite a strain in adjusting themselves to their new environment. They are full of energy and often do things on the spur of the moment, failing to consider the cost or to take into consideration the results of their actions. However, if part of their daily instruction consists of safety ideas, habits of thought will make them more aware of possible sources of danger. I do not know of a single high school that has a course of safety instruction complete for one semester. Strangely, we seem to be willing to spend more for hospital bills and pain and sorrow after the accident than we are to prevent those accidents. One is reminded of the story about a dangerous bend on a certain steep road where there had been many accidents. The good people of the community held a meeting to determine what could be done. They finally decided to build a hospital at the base of the cliff. A good stout fence at the top would have cost less and accomplished a great deal more.

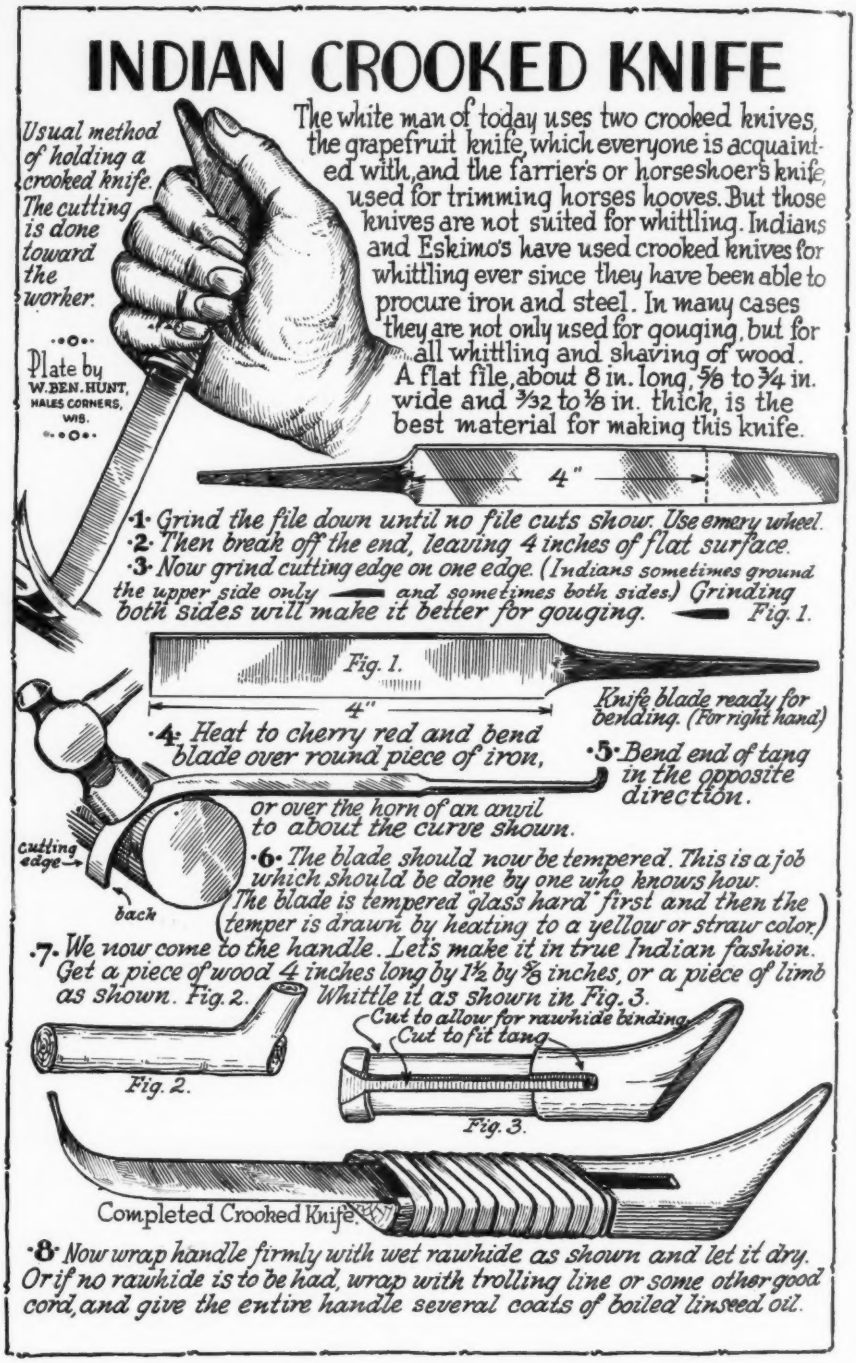
The Time to Stop Accidents Is Before They Happen

All boys and girls of the high-school age ought to be instructed in safety. This would tend to keep them out of the hospitals and, worst of all, from going through life maimed.

Of what use is an education if the student is to be one of those who will be killed or permanently disabled for life? Statistics show that the percentage of pedestrian deaths including the fourteenth year for 1937 was 19 per cent. We should be safe in assuming that above the age young people and adults are more careful and less likely to be injured, but we cannot help but be alarmed when we realize that 71 per cent of pedestrian deaths occur to those who are above the age of fifteen years.

Develop a Grudge — Have One Against Accidents

The mind of the child is still in the formative stage when he enters high school, giving an excellent opportunity to plant and cultivate the habits of safety. To become safety minded at this age will save the country millions in dollars, but of more importance is the saving in life, suffering, and sorrow. During the year of 1936 our national accident bill amounted to $3,700,000 000. This means that every second $120 was spent to pay for our carlessness. Every five minutes saw some life snuffed out, due to a large part to our indifference to *safety education*.

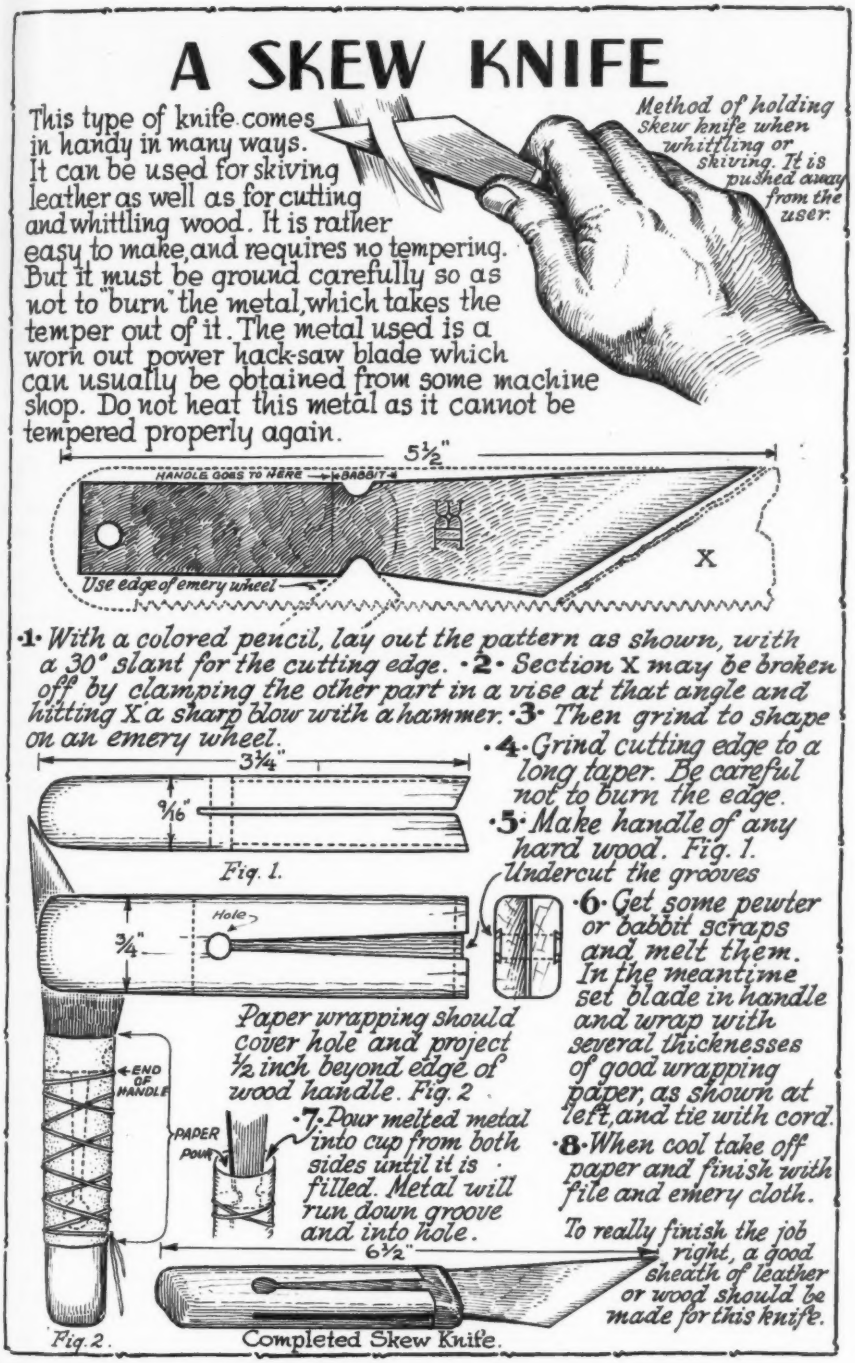

INDIAN CROOKED KNIFE
Usual method of holding a crooked knife. The cutting is done toward the worker.
Plate by W. BEN. HUNT, HALES CORNERS, WIS.
The white man of today uses two crooked knives, the grapefruit knife, which everyone is acquainted with, and the farrier's or horseshoer's knife, used for trimming horses hooves. But those knives are not suited for whittling. Indians and Eskimo's have used crooked knives for whittling ever since they have been able to procure iron and steel. In many cases they are not only used for gouging, but for all whittling and shaving of wood. A flat file, about 8 in. long, 5/8 to 3/4 in. wide and 3/32 to 1/8 in. thick, is the best material for making this knife.
4"
·1· Grind the file down until no file cuts show. Use emery wheel.
·2· Then break off the end, leaving 4 inches of flat surface.
·3· Now grind cutting edge on one edge. (Indians sometimes ground the upper side only and sometimes both sides.) Grinding both sides will make it better for gouging. Fig. 1.
Fig. 1.
4"
Knife blade ready for bending. (For right hand)
·4· Heat to cherry red and bend blade over round piece of iron,
·5· Bend end of tang in the opposite direction.
or over the horn of an anvil to about the curve shown.
cutting edge
back
·6· The blade should now be tempered. This is a job which should be done by one who knows how. The blade is tempered glass hard first and then the temper is drawn by heating to a yellow or straw color.
·7· We now come to the handle. Let's make it in true Indian fashion. Get a piece of wood 4 inches long by 1½ by ⅞ inches, or a piece of limb as shown. Fig. 2. Whittle it as shown in Fig. 3.
Cut to allow for rawhide binding
Cut to fit tang
Fig. 2.
Fig. 3.
Completed Crooked Knife
·8· Now wrap handle firmly with wet rawhide as shown and let it dry. Or if no rawhide is to be had, wrap with trolling line or some other good cord, and give the entire handle several coats of boiled linseed oil.

Losses from Accidents Can Never Be Regained

Our national, state, and city governments are building the hospital rather than the fence. When will educational forces give the green light for this war on the destroyer of our national life? Our total expenditures on education is less than the cost which *carelessness* collects from us each year. We fight disease, plagues, and endeavor to lengthen life; then we show our inconsistency by killing, maiming, and causing immeasurable suffering. We prepare our youth for college, being careful to see that he has the proper credits, and neglect to train them in the fundamentals of safety. Unused talents in time will be taken from us, and lessons of safety taught in grade school are soon forgotten when new interests are aroused.

Safety Committee at Crane

Recently a student committee on safety was organized and one of its duties will be to distribute machine permits to all students entering school. These permits must be returned bearing the parent's or guardian's signature. The signed permits will be filed in the shop supervisor's office. Students leaving through graduation or otherwise will have their permits removed. It will be noticed that the rules cover the operation of machines


A SKEW KNIFE
This type of knife comes in handy in many ways. It can be used for skiving leather as well as for cutting and whittling wood. It is rather easy to make, and requires no tempering. But it must be ground carefully so as not to "burn" the metal, which takes the temper out of it. The metal used is a worn out power hack-saw blade which can usually be obtained from some machine shop. Do not heat this metal as it cannot be tempered properly again.
Method of holding skew knife when whittling or skiving. It is pushed away from the user.
5½"
HANDLE GOES TO HERE
BABBIT
X
Use edge of emery wheel
·1· With a colored pencil, lay out the pattern as shown, with a 30° slant for the cutting edge. ·2· Section X may be broken off by clamping the other part in a vise at that angle and hitting X a sharp blow with a hammer. ·3· Then grind to shape on an emery wheel.
·4· Grind cutting edge to a long taper. Be careful not to burn the edge.
·5· Make handle of any hard wood. Fig. 1.
Undercut the grooves
·6· Get some pewter or babbit scraps and melt them. In the meantime set blade in handle and wrap with several thicknesses of good wrapping paper, as shown at left, and tie with cord.
·8· When cool take off paper and finish with file and emery cloth.
3¼"
9/16"
Fig. 1.
Hole
¾"
Paper wrapping should cover hole and project ½ inch beyond edge of wood handle. Fig. 2
END OF HANDLE
PAPER
POUR
·7· Pour melted metal into cup from both sides until it is filled. Metal will run down groove and into hole.
6½"
To really finish the job right, a good sheath of leather or wood should be made for this knife.
Fig. 2.
Completed Skew Knife.

thoroughly and also gives some general rules. This committee will distribute safety posters from the National Safety Council and also student-made posters to the classrooms and shops. Our school has been a member of the council for a number of years. A record is kept of the posters and the shops where they are placed. They are then changed every two or three weeks in order to eliminate the possibility of the student becoming so familiar with the poster that it would lose its effectiveness. The importance of change is impressed upon the committee for we know that the mind is not stimulated to thought by objects that are seen repeatedly. Certain posters have meanings especially suited for a particular shop or laboratory and the boys must always consider this in the placing of the posters.

Co-ordination Between Subjects

Safety hints and sayings are welcomed from the student body and safety sayings and news find their way into the columns of the student daily, *The Crane Tech Chronicle*. The Commercial Art department can help a great deal in creating the safety habit by having the art students make enlarged copies of small cuts, and under the guidance and judging of this department a school-wide contest can be run and prizes awarded for the best original safety poster. The English department should require a paper on safety at least twice a semester. The foundation for these papers can be the safety hints and news column of the student paper and from the posters displayed in each of the classrooms of the building.

Our school has complete movie equipment and through this we are able to show from time to time movies on various safety subjects. We realize that it will take some time to have this work progress smoothly but it is certainly worth the effort.

Every school could well afford to devote time to this safety training and every group of schools should have a safety-minded supervisor devoting full time to the organizing and development of a safety campaign. That it will be of great value there can be no doubt; the question is, "Will those in power build the fence now or spend more for the hospital tomorrow?"

Foundry Safety

The foundry laboratory of Crane is proud of its safety record and this can best be explained by the fact that safety has been as much a part of our course as that of producing castings, for we realize that safety cannot be separated from our work. A careless worker is a hazard to the whole shop. In eleven years that the author has been connected with the foundry, with an approximate turnover of "labor" of 100 per cent every six months, we have had only three lost-time accidents. This amounts to 816,750 student work hours, a record which I am quite sure would meet with approval of men in industry.

Again I would plead with school authorities everywhere "Find a place in your curriculum for safety education not as something to be put in if there is room, but as a regular part of the educational program."

SIMPLE METHOD OF MAKING RUBBER STAMPS

Julian Silver, Oswego, New York

There has long been a need in the school print shop for a method of rubber-stamp making that is simple, inexpensive, and yet foolproof enough for the average student to handle with any degree of success. To date, the only method for making rubber stamps was essentially the same whether practiced commercially or done in a school print shop. The process involved expensive vulcanizing and stamp-maker's equipment very often beyond the budget of a large majority of

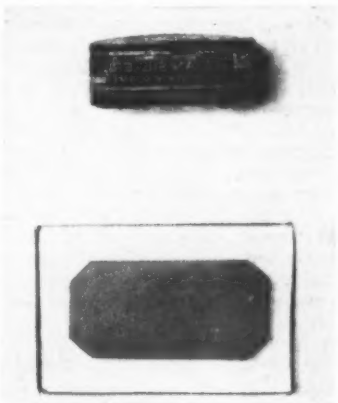


Fig. 1. Ready to make the impression

school shops. The skill necessary in handling this equipment from the taking of the impression to the actual vulcanizing of the stamp was frequently beyond the ability of the student. In the schools fortunate to have stamp-making equipment, the instructor would usually do the more difficult operations such as taking the type impression and vulcanizing

Fig. 2. Making the impression deep enough

the actual set of stamps for the class, the students often doing no more than set the type and mount the finished stamp. Still, stamp making is considered an important and desirable project in the few school print shops that carry it on.

By using a liquid self-vulcanizing latex, common to rubber-mold makers, the author has developed a simple method of rubber-stamp making, utilizing no more equipment and materials than a small water-color brush, a piece of window glass, a block of preserving wax, printer's type, and a small amount of liquid latex. The process is simplified to such a degree that the school print shop student can get excellent results with this new method. It has the added advantage of enabling the boy to perform every operation from the setting of the type to the actual making and mounting of the finished stamp.

A representative group of junior-high-school boys of average ability have tried out this method and it was found to be completely successful. It further proved that rubber-stamp making could be done by any home-craftsman or as a print-shop project regardless of the equipment or the funds available. A finished stamp, fixed to a homemade mount, will cost less than one cent as all the materials may be used over again with the exception of the latex.

The type for stamp making is set as in ordinary composition. However, brass hair-line rules are inserted approximately one pica distance from the type at the head and foot of the job. These rules serve as bearers and help to give an even and accurate impression. The type is tied up in the stick as this is the most convenient place in which to make the impression.

The wax used for taking the impression of the type is most conveniently used in sheet form approximately ⅛ in. thick. Build up a border ⅛ in. high around the edges of a small pane of glass. This can be done by gluing strips of cardboard around the edges. Grease the surface of the glass with any grease or lubricant and place it on a level table. Pour molten wax on the surface of the glass until it is level with the top of the ⅛-in. border. When the wax is cooled sufficiently it may be cut into strips and removed from the glass.

Making the wax impression is the next step. Cut a piece of sheet glass approximately 2 by 3 in. Remove the sharp edges and corners with emery or sandpaper. Fuse on to the glass a piece of sheet wax about ½ in. longer and wider than the type. This is easily done by heating the surface of the wax by passing it several times over a candle or alcohol flame and pressing the wax on to the surface of the glass. See Figure 1.

Heat the surface of the wax again until the entire piece is quite soft. Place the wax on the face of the type and press down evenly and firmly until the brass rules and the type show up clearly and equally at all points from the back of the glass, as shown in Figure 2. Allow a few seconds for the wax to chill then remove it from the type.

The wax risers that separate the words and lines must now be cut away to prevent the finished stamp from being divided into several pieces. With a razor blade or other convenient tool cut these projections down to about the height of the impression of the type shoulder. See Figure 3.

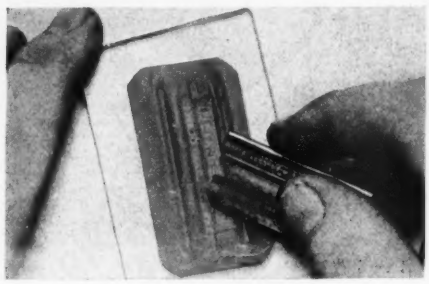


Fig. 3. Cutting down the wax risers between the lines

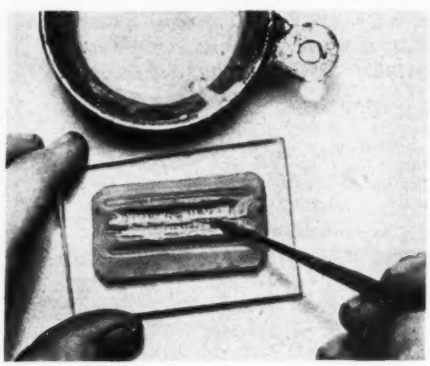


Fig. 4. Applying the latex

Dilute a few drops of liquid latex with one third its volume of water. With a small water-color brush fill the bottom of the letters with the latex solution, as shown in Figure 4. Blow across the impression vigorously to release any trapped air bubbles. Holding the glass up to the light will show any trapped air bubbles as white spots in the letters. Allow this coat about 15 to 20 minutes to dry. Placing it near a hot-air draft will greatly hasten the drying of each coat. Follow the same procedure with the second coat. For the third and successive coats pour a little of the latex solution into a small container and apply it undiluted. The third coat should completely fill the impression of the letters. As the latex stands in the open container it will thicken and by the time the third coat has dried you can apply a heavier coating with this thickened solution. Take care that the glass lies level and flat for as the solution levels off and dries any high parts on the back will give a heavier impression to some letters and a lighter one to others when using the stamp. The fifth coat is flowed on in the same manner as the fourth. The stamp should now be over 1/16 in. in thickness. Ample time should be allowed for each coat to dry thoroughly. It will take a heavy coat more than an hour to dry at room temperature. If in doubt as to whether the coating is dry all the way through, prick the surface with a pin point. If it passes through the surface or leaves a noticeable dimple it is still wet under the surface. When thoroughly dry it will have the same resilience as vulcanized rubber.

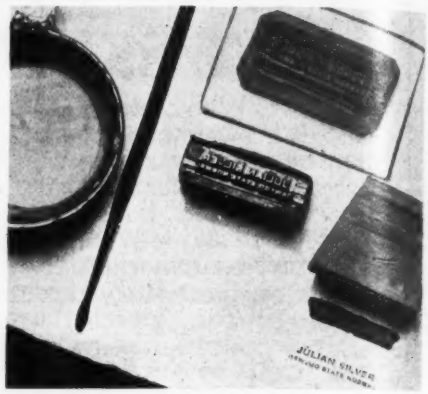


Fig. 5. The finished rubber stamp

When the last coat is completely dried, strip the stamp off the wax. Keep the wax impression as it is good for any number of stamps. With a scissors trim off the excess rubber to within 1/32 in. of the letters. The stamp is now ready for mounting. Regular mounts and handles may be bought cheaply from stamp-maker's supply houses. Handmade mounts and handles serve as well as the commercial ones but do not give that professional appearance. See Figure 5. If the stamp is going to stand hard use it is best to back it up with the regular ⅛-in. stamp-maker's sponge-rubber backing. For ordinary use, however it may be cemented to the bare wood with ordinary Duco household cement.

KNOW YOUR LACQUER

A. C. Newell,
Pasadena, California,
Emeritus Professor, Illinois State Normal University

Fascinating with interest and often of golden value to a craftsman or owner is useful knowledge about materials. Just as an ignorant blunder by a druggist in mixing medicine may cause danger or suffering to a patient, so may a wrong mixture by a painter or wood finisher prove to be unsatisfactory or spoil a fine surface. As an example: a floor finisher placed a wrong mixture in some varnish and spread a coating over the floors of a house. He was paid for his work and the material and went away. The varnish would not dry and had to be removed. The owner had to pay for the removal of the varnish and for refinishing the floors. Just what the painter, possibly through ignorance, added to a supposedly good varnish to spoil it is unknown.

The Rise of Lacquers

The Stevens patent for a mixture of amyl acetate and celluloid cotton in 1882 is usually considered to be the beginning of the use of nitrocellulose lacquers. Collodion mixtures of pyroxylin with ether-alcohol had been known from about 1850, but they were too volatile for practical use as finishes.

The early lacquers after the time of Stevens were pale in color; but they were quite durable because of their toughness and soon were used as coatings for polished brass, especially, and on other types of metal. To some extent, lacquers were employed as leather finishes, sometimes in connection with oils. The woodworkers and home repairmen were probably

Bales of raw cotton linters composed of short, raw cotton fibers left on the boll after the larger fibers have been removed. These constitute the principal raw materials used in the manufacture of finishes

introduced to lacquer through its use as a vehicle for the spread of metal powders, especially for gilding with bronze and later on for coating with aluminum.

Tradition among furniture men indicates that the first important exhibit of furniture finished with nitrocellulose lacquer was that at the Chicago's World Fair in 1893. The early lacquer finishes were alluringly transparent; consequently the thin, dull luster of the coatings gave one a feeling that he could see the beauties of natural wood without an intervening glasslike coat of varnish. Commercial production of nitrocellulose lacquer of a type more like that of the present day seems to have appeared in the United States about 1922.

Acetone because of its great solvent power for nitrocellulose, was placed in many of the early lacquers. It was found, however, that when acetone was used in more than minor quantities, its extremely rapid evaporation made lacquer application very difficult because the coatings made with it "set" too rapidly and brush application was difficult. Lacquer manufacturers gradually learned that there is no single solvent for nitrocellulose which is ideal, and that it is advisable to select a mixture of solvents. Amyl acetate was one of the favorites during early days, but it was too expensive; consequently other solvents that were cheaper were often mixed with it.

Recent Improvements in Lacquers

Very great improvements in lacquers have appeared during the past eight years. During this short period there has been a considerable change in the resins used — a shift to synthetics at least in part; also the introduction of cheap butyl acetate and butyl alcohol as solvents for nitrocellulose and resins; and quite recently the substitution of inexpensive petroleum hydrogenated naphthas, such as solvesso, for the more costly diluents particularly toluol and xylol. Some of these shifts, such as the use of synthetic resins, have added distinctly better qualities or more varied uses to lacquer while the other changes have simply aided in lowering the price so much that at present the cost of lacquer compares favorably with that of such other finishes as varnishes of a good grade.

The changes in lacquer composition already mentioned have made other improvements possible. We might mention the use of heat-hardenable lacquers made from Bakelite resin of a special type, lacquer emulsions offering some probable advantages, and flexible lacquers containing rubber.

Lacquer Composition

It is quite true that lacquer is a newly born finishing material; and, in addition to newness, it is complex in composition and somewhat mysterious in its reactions. Like some other youngsters, it has individuality and differences are obvious. It should be remembered that present-day lacquers are somewhat different in various respects from those of a few years ago. A brief discussion of the composition of lacquer may be of interest.

Lacquer components may be divided roughly into practically two divisions: (1) the solids

A "devil duster" in which the raw cotton is agitated to shake out the dust and loose foreign matter preparatory to its manufacture into finishes

which are used in forming the films, and (2) the volatile liquids which are used simply as vehicles to dissolve the solids and carry them in solution while the films are being spread upon surfaces.

The solids placed in lacquers by the manufacturers are usually of three kinds; namely, nitrocellulose, resins, and plasticizers. Some of the synthetic resins, however, act both as resins and plasticizers.

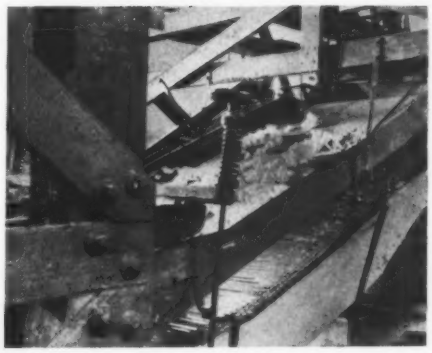
The evaporating or volatile liquids which are placed in lacquers must be composed of some solvent that will dissolve nitrocellulose and a solvent for the resins which are incorporated into lacquer mixtures in order to produce thicker films and add some other qualities not found in nitrocellulose alone. No one solvent is known that is a practical and satisfactory solvent for both nitrocellulose and the resins which are preferred. In addition to the two volatile liquids which are used to dissolve the nitrocellulose and the resins, a cheaper liquid that will blend with the other ingredients and thin the mixture is also needed. Such a volatile liquid is often called a diluent.

Film-Forming Lacquer Solids

Nitrocellulose, the ingredient included in most lacquers which makes it more distinctly different from varnish, is incorporated into nearly all lacquers now sold on the market. Rather recently, there seems to be a rise in the use of cellulose acetate instead of nitrocellulose. The chief use of cellulose acetate is said to be in the manufacture of films of a noninflammable type for use in moving and X-ray pictures. There is also a growing use of this substitute for nitrocellulose in the manufacture of brushing lacquers, dopes for airplanes, and for covering surfaces that may become hot.

Nitrocellulose

Though somewhat similar to gun cotton in composition, nitrocellulose is less highly ni-



A section of the continuous conveyor type of dryer used to dry thoroughly the cotton following its purification for use in manufacturing finishes

trated and is not explosive though very highly inflammable. The nitrocellulose used in lacquer is nitrated to about 12 per cent while gun cotton contains not far from 13 per cent of nitrogen.

Nitrocellulose, when used without resins, does not produce satisfactory coatings. Such films without resins lack adhesion and flexibility or elasticity. They are quite brittle and tend to shrink and peal off from a surface altogether too easily. These undesirable qualities of nitrocellulose can be corrected by the use of proper plasticizers for softening the films and the addition of varnish resins which produce body and bestow other good qualities.

Short fibered cotton, commonly called *cotton linters* is separated from all impurities and wax by use of a machine, sometimes called a *devil-duster* by the workmen, which pulls the fibers of cotton apart and removes all dust by a strong air draft. Then follow washing in a hot lye solution and bleaching to remove all color from the cotton because lacquer itself should be entirely transparent. Drying the linters until absolutely dry is important before treatment with acid. If water is carried into lacquer, it is apt to cause *blushing* and roughness of the surfaces of the films.

Nitrocellulose or pyroxylin is really a nitric acid ester of cellulose which is produced by treating dry, clean cotton linters with a mixture in very definite proportions of sulphuric and nitric acids. The mixed acids and cotton linters are placed in a vat and agitated for about half an hour — and the result is pyroxylin. Washing in water to remove the acid follows. A hydraulic press squeezes out the water, and then ethyl alcohol is forced into the pyroxylin in a definite amount and left to keep it wet in a 30 per cent mixture. Though inflammable this mixture is not explosive.

The solubility of pyroxylin varies with the slightly permissible variation in nitration. Closely related to solubility is viscosity which should usually be low — often of the ½ second type. The high viscosity of the early types of nitrocellulose or pyroxylin meant relatively large amounts of solvents and thinners, and this excess in liquids produced thin lacquers and thin films.

What You Should Know

1. *There is no all-purpose lacquer.* Just as there is no all-purpose varnish that is good for inside finish and furniture, for floors, and for outside exposure to the weather, so it can also be truthfully stated, that there is no lacquer that is good for all types of uses. It is common knowledge that short-oil rubbing varnishes, such as those used for furniture, should

not be used out of doors where a long-oil spar varnish is needed for exposure to the weather. It is also known that some resins are more resistant to water and the weather when used in varnishes than are others.

2. *Lacquers vary in composition.* Lacquers are not all alike but are also compounded for various uses. The exact parallel of long oil and short oil does not carry over into lacquer because in general little or no oil is used in lacquer manufacture. Lacquers at present vary considerably in composition, however, depending somewhat upon price but especially upon their intended use.

3. *Prepared stock solutions used in mixing.* The compounding or mixing of lacquers in factories is not so difficult as one might suppose. A supply of pyroxylin or nitrocotton solutions varying in viscosity from about ¼ or ½ seconds up to 60 seconds or more may be kept on hand. The solutions are prepared from nitrated cotton and suitable solvents which may vary somewhat in boiling points and evaporation rates. Then, there are solutions of solvents and various resins which provide known characteristics for lacquers, such as ester gum for low cost, good gloss, and thickness of films — qualities that are good for indoor coatings but not for weather exposure. For outside use, a solution of Paraplex RG-2 might be chosen to give durability, toughness, and good weathering qualities. In order to produce elasticity and softness, plasticizers are also added to lacquer mixtures unless the special synthetic gums that are chosen also act as plasticizers as well as resins.

Pigment grinds are also prepared and are added when lacquer enamels are wanted instead of clear lacquers.

In addition to the nitrocellulose in its solvents, the resin or resins in solvents, and the plasticizers, a cheap thinner, which is needed in lacquer to give it greater fluidity and reduce its selling price, is mixed and ready for use.

The prepared stock solutions of nitrocellulose of different viscosities, various resin solutions, a few plasticizers, and diluents of several types, together with pigment grinds of quite a number of colors to use in lacquer enamels, can be mixed properly and in this way make most almost any kind of lacquer that is wanted.

4. *Lacquer composition varies with its purpose.* The manufacturers have found out the special characteristics or qualities of each stock solution by tests, and that means that they can make lacquers which are appropriate to almost any requirements by mixing the most suitable solutions. For example — a present-day brushing lacquer often contains an unusually large amount of some synthetic resin in its solvents together with a small proportion of nitrocellulose in some solvent which evaporates slowly such as butyl lactate. Such a lacquer can be spread with a brush about as easily as varnish can be applied, but it would not be satisfactory as a spraying lacquer even though thinned enough to be used in a spray gun.

5. *Lacquers for many purposes now obtainable.* Special lacquers can now be obtained on the market for use with a brush, for spray-gun application, for furniture and inside use in gloss or dull effects, for exterior coatings which will be durable in the sunlight and during wet weather, for undercoats such as sanding sealers, for dipping, for roller spreading, for lacquer enamels in various colors to be used on automobiles and metalwork, and for quite a host of special uses. There is no special all-purpose lacquer; consequently the user should know his lacquer before applying it.

6. *Use lacquer thinner recommended for each lacquer.* No lacquer thinner is known that is suitable for thinning all lacquers. One should remember that formulas for lacquer thinners vary considerably. The wrong thinner placed in your lacquer may be a troublemaker. Success will probably be yours by providing yourself with the lacquer thinner made for your lacquer by the manufacturers.

7. *Follow the application method intended for your lacquer.* It is necessary to vary lacquer compositions considerably in order to produce lacquers that are suitable for the various methods of application. Brushing lacquers, spraying lacquers, and dipping lacquers have individual characteristics and are most satisfactory when applied by the method suggested by the manufacturer.

8. *Manufacturers indicate purpose of lacquers.* Manufacturers usually state on the containers for what purpose the lacquer is to be used; consequently, if a user obtains a good quality of material and of the kind intended for his special use and then thins when needed with a suitable thinner, he will not go far wrong.

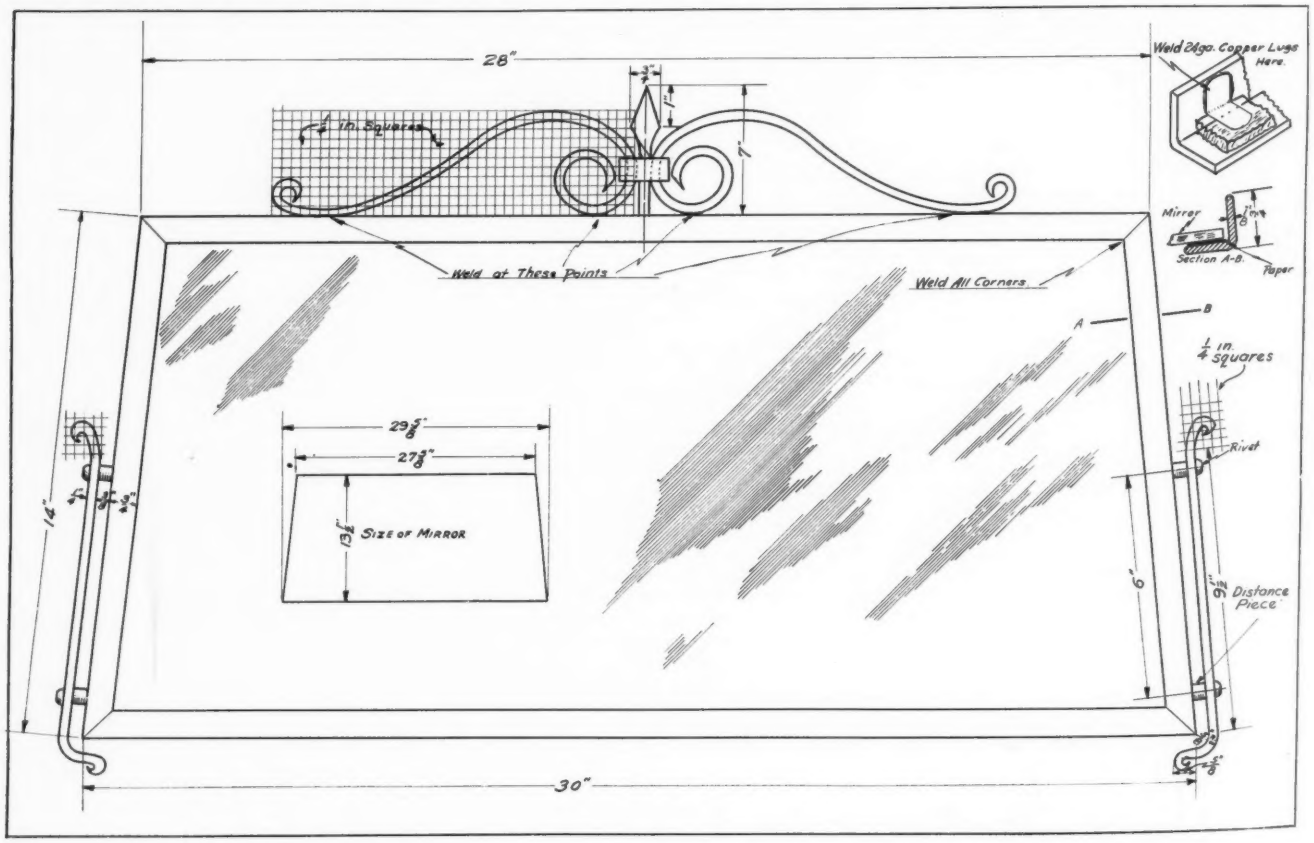
WROUGHT-IRON MIRROR FRAME

David F. Jackey, Supervisor Industrial Education, University of California, Los Angeles, California

The accompanying illustration shows an excellent project for the forging and oxyacetylene class.

For the frame of the mirror, ¾ by ¾ by ⅛-in. angle iron is used. The material for this part requires 2 pieces 14 in. long, 1 piece 30 in. long, and 1 piece 28 in. long.

For the forged decorative pieces fastened to the sides of the frame, use flat wrought iron shaped as shown. If the pieces are drawn



Wrought-iron mirror frame designed by David F. Jackey, Los Angeles, California

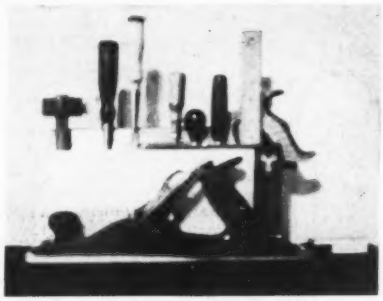
out full size before the parts are forged, it will be easier to work them to the proper shape. Two pieces of ¼ by ½ by 12½-in. wrought iron are used. These are fastened to the frame by means of welding instead of riveting. If the welding is largely done from the back side of the frame, the unsightly welds will not be visible on the face of the frame.

The two curves at the top are fastened together by means of a ¼ by ½ by 2½-in. band of wrought iron. This piece does not need to be welded if carefully forged into place. The placing of the two curves and spearhead into position and proper fastening by the band must be done before the pieces are welded to the frame of the mirror.

A piece of ¼ by ½ by 3-in. wrought iron is required for the spearhead. The end of the spear should be flattened to the width of ¾ in., and the spear angle should start at 1 in. from the end. The spear should then be given a half turn.

The size of the mirror is given in the illustration. It is a little smaller in size than the inside dimension of the frame when completed, thus assuring clearance. In fastening the mirror into the frame, cut a paper gasket of heavy paper or blotting paper to fit on the inside of the frame against which the mirror will rest.

To fasten the mirror into place, and to keep it from falling out, several lugs shaped into right angles and made from 24-gauge copper, should be welded to the inside of the frame. They must be welded into place before placing the mirror into the frame so as not to crack the mirror from the heat. About eight of these, two on each side and two on the top and bottom, should be sufficient.



Bench tool holder

In order to hang up the mirror, two small ½-in. harnessmaker's rings are welded to the proper places inside the frame on both sides. Heavy strawboard should, of course, be placed on the back of the mirror and fastened down with the copper lugs.

BENCH TOOL HOLDER

Linwood A. Abbott, Saco, Maine

The unit is designed to hold the following tools: Jackplane in front, held by the little wooden clip; the 10-in. backsaw on the back; the 6-in. try square on front right end; starting from the left end, the marking gauge comes first, ¾-in. chisel, ¼-in. chisel, 6-in. screw driver, scratch awl, knife, and the foot rule.

When all the tools are in place, the unit is perfectly balanced, but with the plane off and the bench being jarred, the unit is apt to fall over, so to rectify this, the little clip on the right end was screwed to the bench. A small cleat nailed to the bench at the other end holds that end.

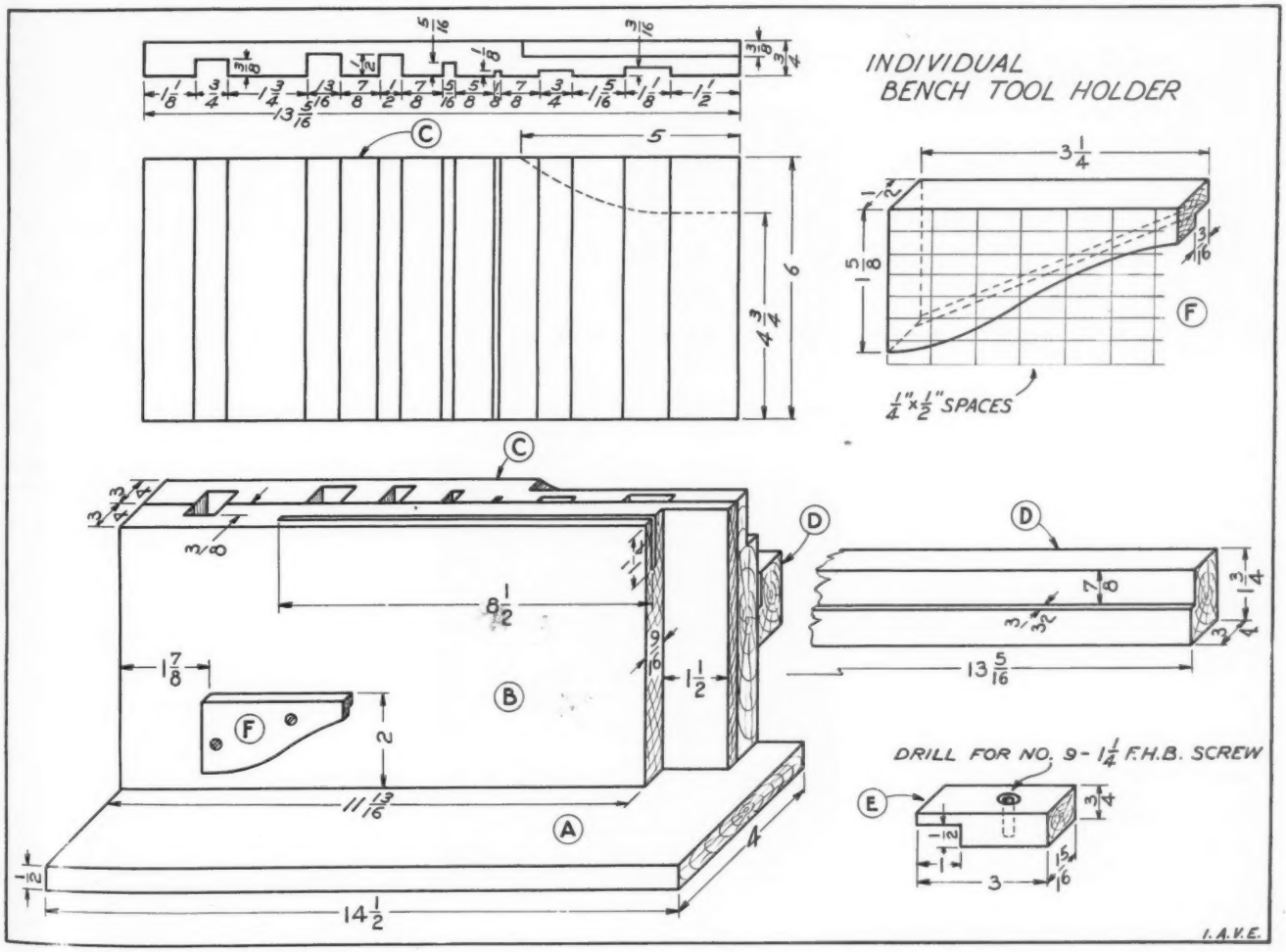
Pine may be used for the material, the body consisting of two ¾-in. boards. Lay out the necessary lines on the back member of the body, and with the dado cutters set for the first dado on the left end, run all units through. Do the same for each of the other dado cuts. The place to receive the handle of the backsaw was cut by running over the dado cutters, set to cut a depth of 1¼ in. The part for the blade of the try square was cut by a circular-saw blade that made a kerf of the same thickness as that of the square blade. All parts are fastened together with f.h. screws.

WALL SCONCE

Leon H. Baxter, Association for Crippled and Disabled, Cleveland, Ohio

The wall sconce shown in Plate 10 should be made in pairs, as they look very nice on each side of a mirror or over a side table.

The back *E* is made of a 1½ by 15-in. piece of 16-gauge copper. As shown in the detail of this part, the ends are wider than the main part. To make piece *E*, draw a full-size outline of it on paper, then starting



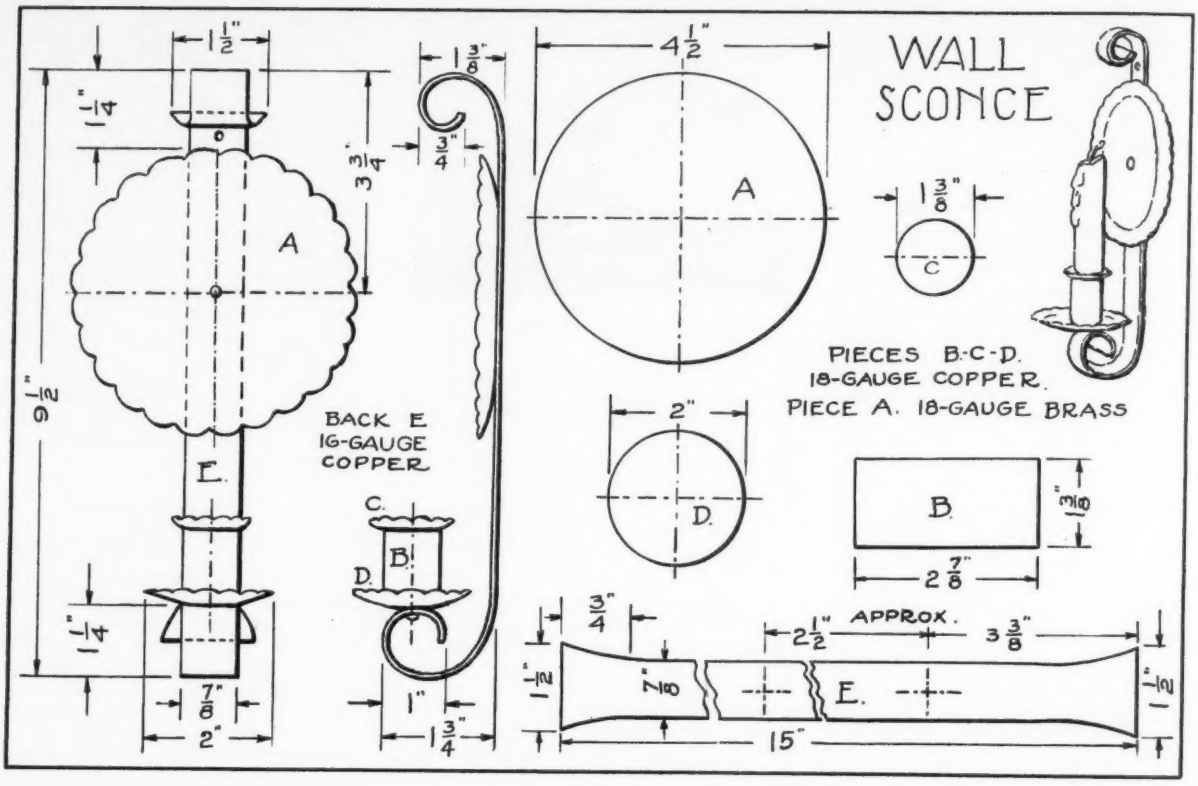


Plate 10

with the ⅞ by 15-in. piece of copper, flare out ¾ in. at each end until it is 1½ in. wide. Locate and drill ⅛-in. rivet holes where shown and then planish the piece on all surfaces and edges. Anneal to soften.

Bend the two ends to the curves shown in the profile view of the drawing, using a ¾-in. piece of rod or pipe.

Make drip pan *D*, 2 in. in diameter from a piece of 18-gauge copper. Divide the circumference into 16 equal divisions and sketch uniform scallops around the edge.

Saw and file these carefully and cup out the piece as shown, either hammering the piece over a stake or into a lead block. Planish surfaces and edges.

Drill a ⅛-in. rivet hole in the center. Place pan *D* on the lower curve of piece *E*, and when it is located centrally and level, mark the contacting point for the rivet hole in *E*. Drill with a ⅛-in. drill and rivet in place.

Make holder *B* by either method described on page 305, September, 1938, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. Planish the surface of *B*. Make drip cup *C* and divide, scallop, and finish as was done with *D*.

Place *C*, cupped side down, on a piece of board and place *B* centrally on it. Place flux and bits of solder at the point of contact and apply heat with torch. See "Soldering," page 305, September, 1938, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. Locate *B* at the central point of pan *D*, place flux and small bits of solder on the inside edge and solder in place.

Make the reflector *A* of 18-gauge brass, 4½ in. in diameter. After cutting this disk, carefully divide the edge into 24 equal parts and scallop in a uniform manner. Cup out the reflector and polish carefully.

Drill a ⅛-in. rivet hole in the center of the reflector, and rivet it in place on part *E*. If the sconce is to be fumed (see "Finishing," page 306, September, 1938, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION) this operation should be done before the reflector is riveted to *E* so as not to tarnish *A*, after the final finishing is done. Make two of these sconces and it is interesting to note how much quicker the second one can be completed.

Playground ladder

THREE-LADDER PLAYGROUND UNIT

Dale Van Horn, Lincoln, Nebraska

Made from a center column of 3-in. pipe, and three 1-in. pipes, evenly spaced, 30 in. from the center, this unique triple-ladder playground unit proves popular. Each rung is ½-in. pipe with both ends welded into the uprights. They are spaced 24 in. apart.

The units was assembled on the ground, 36 in. of each upright being set in concrete in the ground. After the holes for the concrete had been dug, the ladder was raised, pushed into the concrete, and plumbed. Then the concrete was allowed to harden. A coat of aluminum paint completed the job.

This ladder is excellent for developing muscles. The children have already invented several games which can be played upon the ladder, the simplest being to see who can first walk up one side and down the other of one of the ladders.

ADJUSTABLE EQUIPMENT STANDS FOR AUTO MECHANICS

Linder S. Wood, High School, Bloomington, Illinois

The equipment used for instructional purposes in auto mechanics may be divided into two general classes — that which is brought into the shop for temporary use and that which is installed for permanent use. The temporary equipment consists mainly of auto-

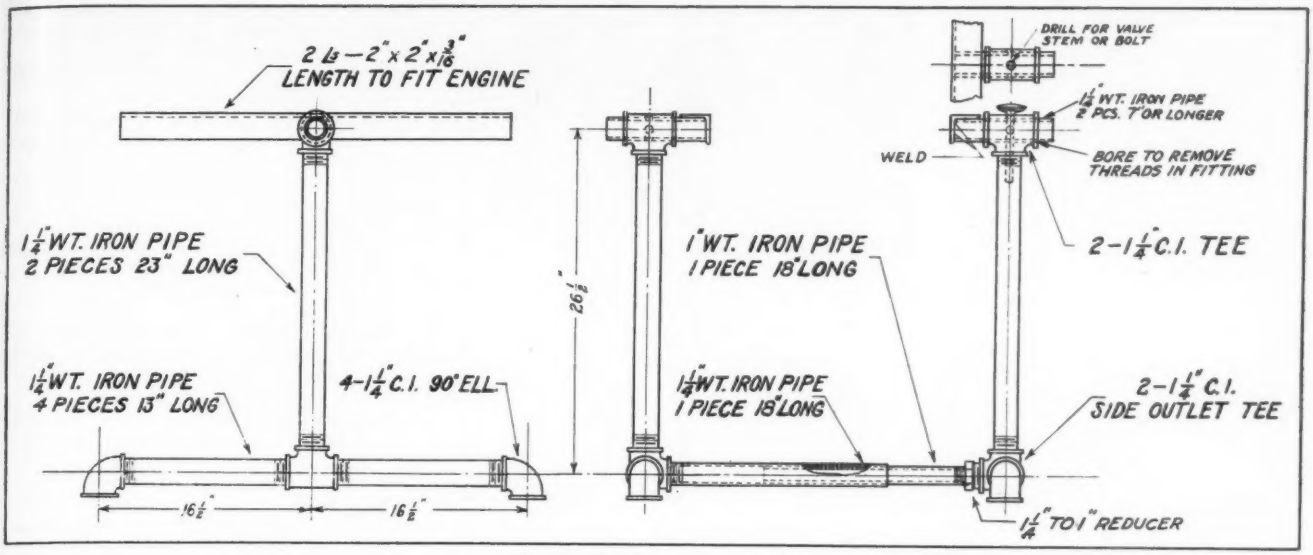
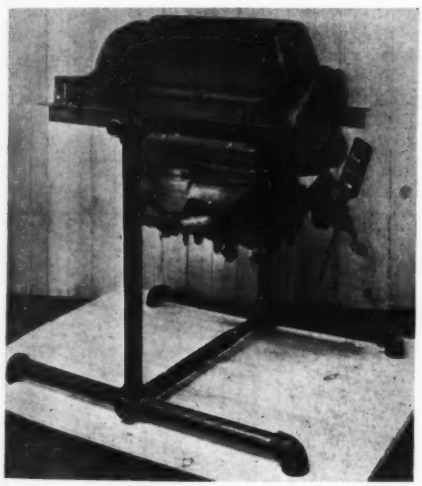

2 Lg — 2" x 2" x 3/16" LENGTH TO FIT ENGINE
1 1/4" WT. IRON PIPE 2 PIECES 23" LONG
1 1/4" WT. IRON PIPE 4 PIECES 13" LONG
4-1 1/4" C.I. 90° ELL
16 1/2"
16 1/2"
26 1/2"
1" WT. IRON PIPE 1 PIECE 18" LONG
1 1/4" WT. IRON PIPE 1 PIECE 18" LONG
DRILL FOR VALVE STEM OR BOLT
1 1/4" WT. IRON PIPE 2 PCS. 7" OR LONGER
WELD
BORE TO REMOVE THREADS IN FITTING
2-1 1/4" C.I. TEE
2-1 1/4" C.I. SIDE OUTLET TEE
1 1/4" TO 1" REDUCER

Fig. 1. Rotating motor stand

mobiles that come to the shop for repairs or adjustments, while the permanent equipment includes the various major units and smaller parts of automobiles that have been purchased for instructional use.

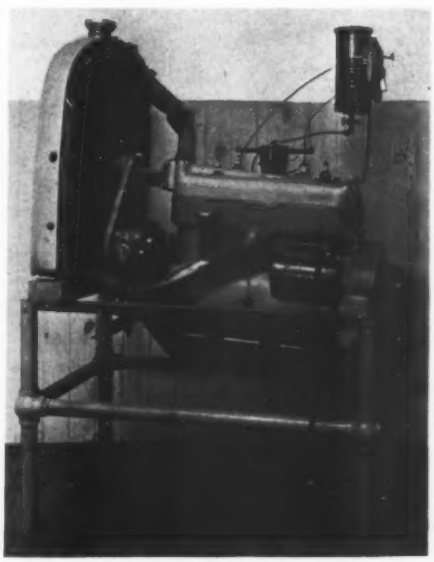


Rotating motor stand

The permanent equipment is a very necessary part of the instructional materials, particularly in shops where beginning courses in auto mechanics are taught. In fact, it must provide all of the laboratory work offered in such courses. For this reason it should be carefully selected and well organized. The various units should be substantially mounted on stands designed to permit easy access to bolts and other fasteners when the units are being taken apart or assembled.

The stands illustrated in this article are examples of the three types used in the high school at Bloomington, Ill. A large number of these have been constructed under the direction of Mr. A. F. Tramontine, teacher of auto mechanics. By referring to the illustrations it will be seen that these stands can readily be adjusted to accommodate various sizes of motors and axles. This feature makes it unnecessary to build a new stand or completely remodel an old one when it is found desirable to exchange an axle or motor for one of a different seize or type.

The rotating motor stand, Figure 1, is designed to permit the rotation of the motor



Adjustable motor stand

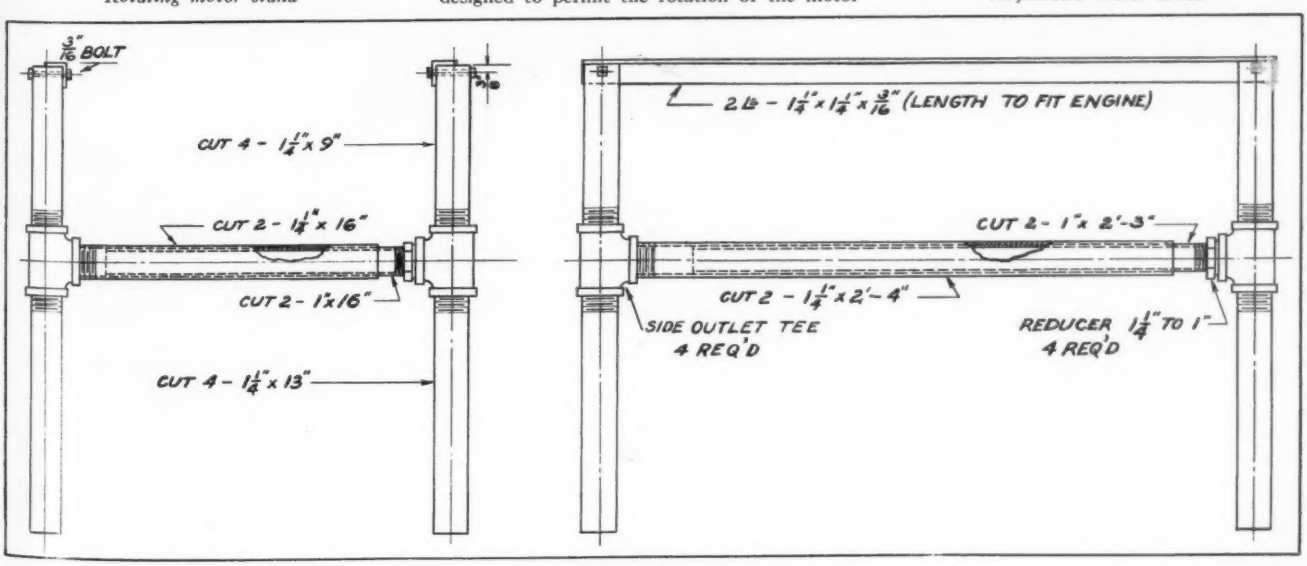

3/16" BOLT
CUT 4 - 1 1/4" x 9"
CUT 2 - 1 1/4" x 16"
CUT 2 - 1" x 16"
CUT 4 - 1 1/4" x 13"
2 Lg - 1 1/4" x 1 1/4" x 3/16" (LENGTH TO FIT ENGINE)
CUT 2 - 1" x 2'-3"
CUT 2 - 1 1/4" x 2'-4"
SIDE OUTLET TEE 4 REQ'D
REDUCER 1 1/4" TO 1" 4 REQ'D

Fig. 2. Adjustable engine stand

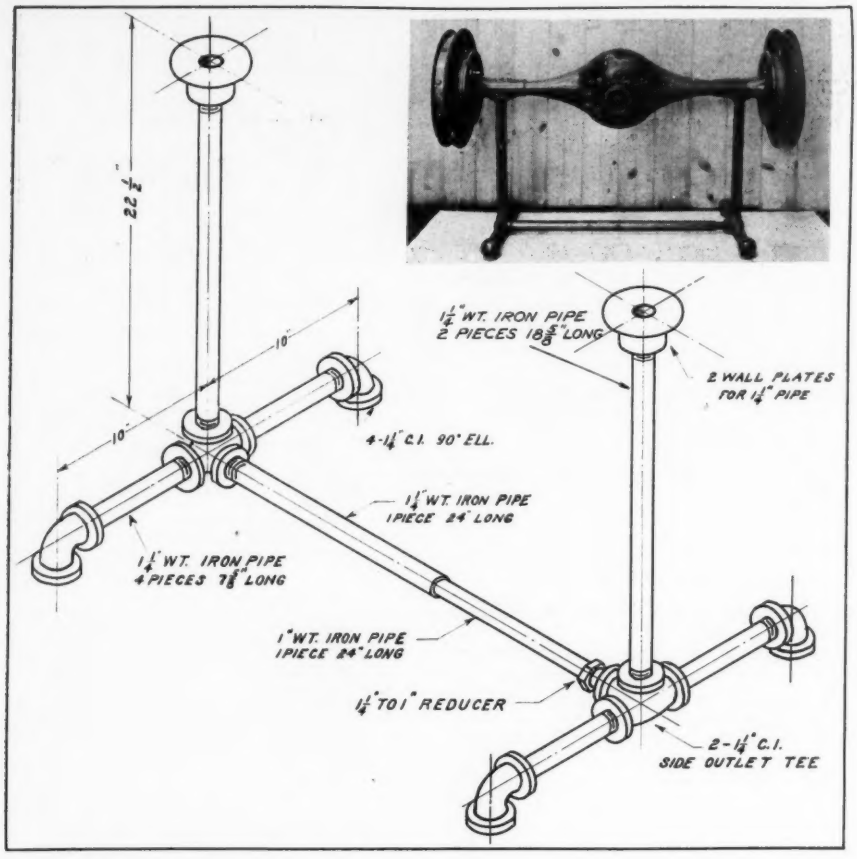


Fig. 3. Adjustable axle-stand

through a complete circle. The motor may be held securely at any convenient angle by inserting a bolt or valve stem through the drilled holes provided for that purpose. These holes are drilled at right angles through the rotating pipe supports, as shown. This permits the workman to hold the motor securely in either its normal position, upside down, or on end.

The adjustable motor stand, shown in Figure 2, can be used to support motors of various sizes since it is adjustable in length and width.

The adjustable axle stand, pictured in Figure 3, serves equally well as a support for front or rear axles of various lengths and designs. The wall plates on the ends of the uprights provide ample surfaces to which the axles may be securely attached.

The screwed fittings used to join the parts of these stands make a very rigid construction which does not require cross bracing.

The building of this type of equipment is a suitable project for the general metal shop and the working drawings may be used as problems in piping drawing for pupils in general drafting.

HOT-WATER SYSTEM

Verrol R. Conklin, Head Industrial-Arts Department, High School, Hastings, Michigan

Many shops have a plumbing unit in general shop, but do not have a practical setup of a simple hot-water system as commonly used in the home.

This job sheet presents the data for the hookup, and the coil, if necessary, may be heated with the forge fire. In this way the student has a hot-water system under actual operating conditions, and the tests may be made according to the job sheet.

Job: To connect up and test a hot-water heating system.

Reasons: To familiarize the student with the fittings and principles of a hot-water heating system.

Tools: Pipe dies, pipe wrenches, monkey wrench, pipe dope.

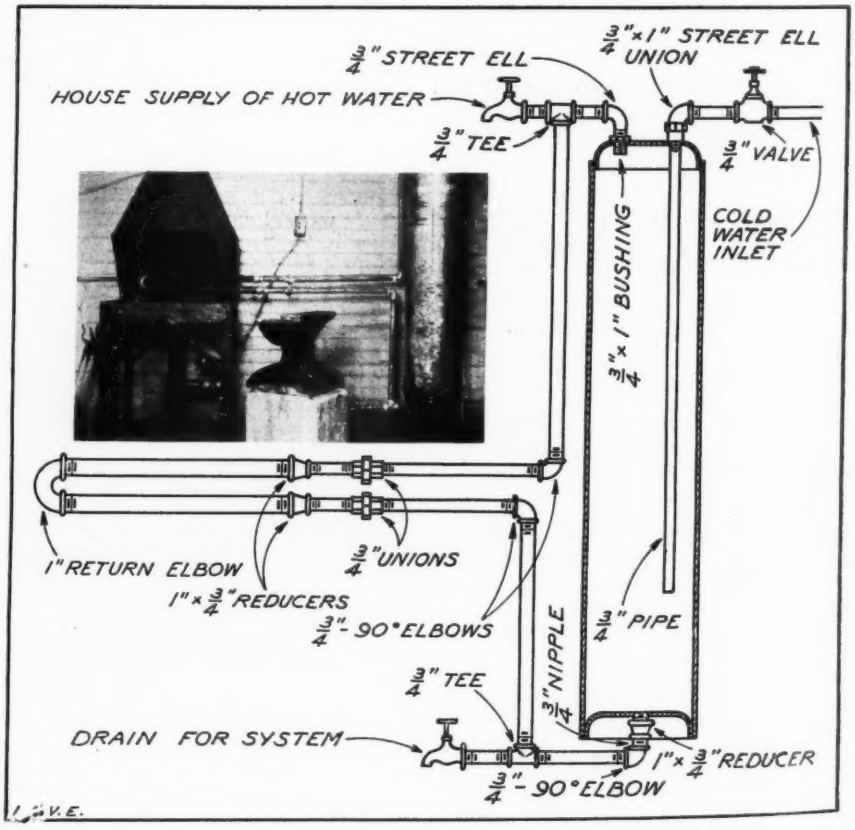
Procedure:

1. Connect up system as shown being sure to use pipe dope on all joints.
2. Open (house supply) faucet.
3. Shut drain faucet.
4. Open cold-water inlet valve and let system fill with water, until it runs out the (house supply) faucet.
5. Close (house supply) faucet.
6. Build fire under coil.
7. Answer all the questions and then drain system.
8. Disconnect all fittings.

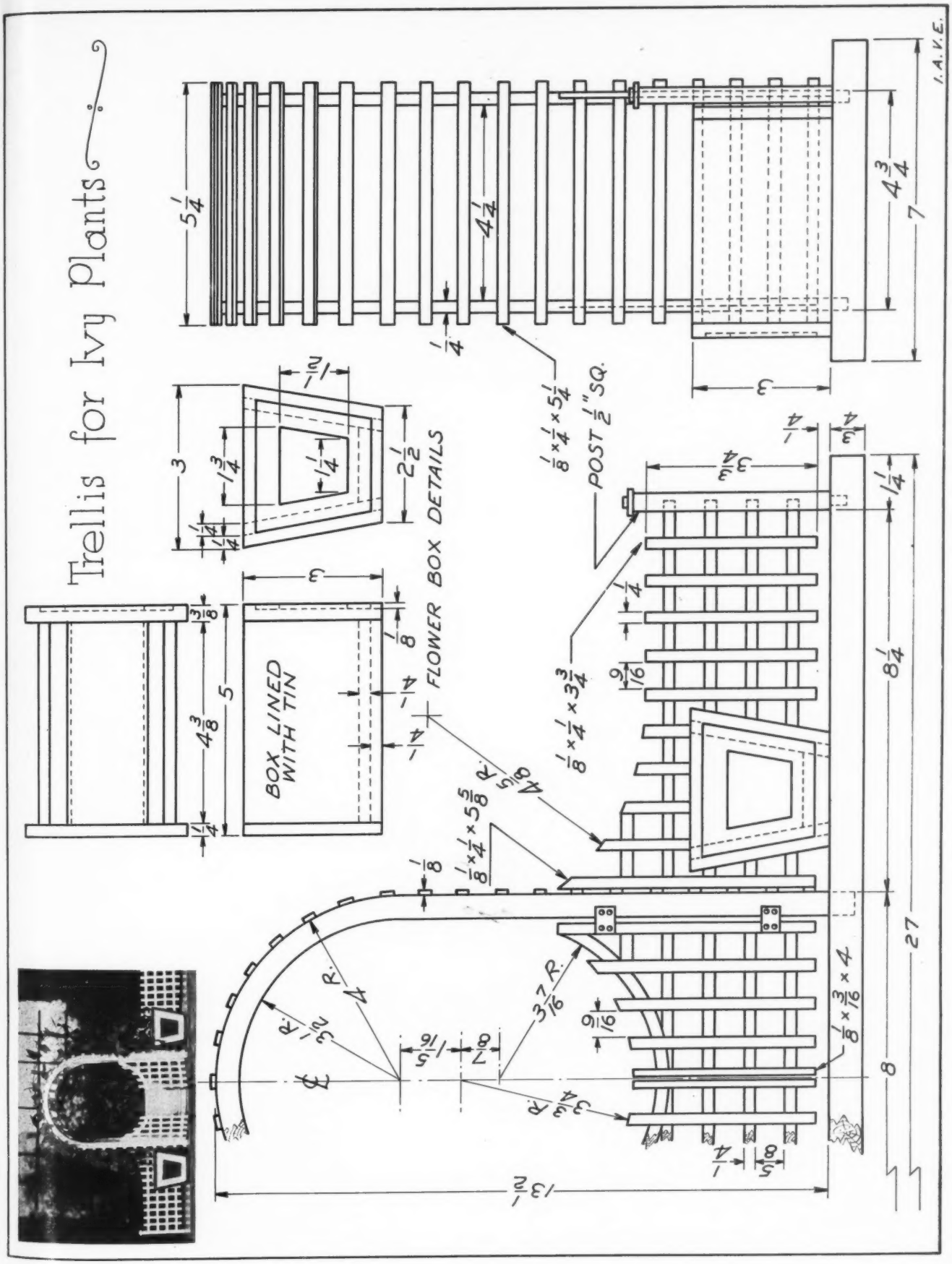
Questions:

1. What happens when the coil is heated?
2. Is the top pipe from the coil hot or cold? Why?
3. Is the bottom pipe from the coil hot or cold? Why?
4. Why does the cold-water pipe extend down into the tank?
5. Give the steps in draining the system.
6. Why is the (house supply) faucet open when filling or draining the tank?
7. Why are the unions placed next to the coil?
8. Why is there a faucet at the bottom of the tank?
9. Why is the valve in the cold-water inlet?

(Continued on page 430)



Hot water system



Submitted by Donald E. Grove. For description of this project, see next page

(Continued from page 428)

10. Why is 1-in. pipe used in the coil?

11. What is the remedy for a coil that is filled with lime?

TRELLIS FOR IVY PLANTS

Donald E. Grove, Senior High School, Beaver Falls, Pennsylvania

The ivy trellis shown on page 429 was prompted by the display of miniature gardens and ivy racks to be found in so many florist's shops today.

It makes a good project for students who have had some woodwork but who cannot afford to pay much for materials in making a project. Scraps can be used for the small pieces, and a great number of arches can be cut out of a ¼-in. panel of plywood, if the pattern is carefully laid out.

A small amount of metalwork is introduced in making tin or galvanized-iron lining boxes for the flower boxes on either side of the gates.

The kind of material used is not important since the whole project is painted white with the exception of the baseboard, which is painted green to represent grass, and the flower boxes which are trimmed with green.

The lattice work was glued and tacked at the intersections until the glue had set after which the brads used in tacking it were removed and the holes were filled with plastic wood.

Personal News

Charles G. Wenzel Retires

With his retirement from the position of supervisor of industrial arts in the Kalamazoo Public Schools, Kalamazoo, Mich., Mr. Charles G. Wenzel terminated a long and successful career as teacher and administrator in this field. After graduating from Central High School of Toledo,

C. G. Wenzel

and Rose Polytechnic Institute of Terre Haute, he taught for eighteen years in the public schools of Toledo before coming to Kalamazoo, in 1911, to teach in the Continuation School. In 1917 he succeeded Mr. George S. Waite as supervisor of a department which has grown steadily since its beginning in 1899. After forty-six years of service, Mr. Wenzel feels that he has earned the right to a respite from the demands of a job. He intends to rest and travel. His many friends wish him many safe journeys and happy homecomings.

Archie P. Nevins Appointed Supervisor

Mr. Archie P. Nevins is the new supervisor named to succeed Mr. Charles G. Wenzel, as supervisor of industrial arts in the public schools of Kalamazoo, Mich. He is a graduate of Western State Teachers College, and has served in the Kalamazoo schools as industrial co-ordinator and as a teacher of shopwork and drafting since 1921, coming into the schools from the auto-body industry where he was engaged in engineering work. Previous teaching experience includes public-school manual-arts work in Hancock and Houghton, Mich., and apprentice supervisor for

Archie P. Nevins

the Packard Motor Car Co., Detroit. During the world war, he served in the U. S. Air Service in a technical capacity, being a member of the first U. S. Aircraft Mission sent to England and France in 1917, later returning to this country to test and inspect Liberty airplane motors. He is the third to become supervisor of industrial-education work in the Kalamazoo public schools since the introduction of this work forty years ago.

♦ Information has just been received that the wife of L. H. Dennis, Executive Secretary of the American Vocational Association, passed away on Friday, October 27, after a critical illness of about six months. I am sure that all of the readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will deeply sympathize with Mr. Dennis in his bereavement.

♦ J. PALMER BOGGS of Washington, D. C., has been appointed field engineer of the NYA. His headquarters will be in Denver, Colo., and his field will be the entire territory west of the Mississippi River.

♦ MRS. ANNA LALOR BURDICK, who for the past 22 years has been agent for trade and industrial work for girls and women, first with the Federal Board for Vocational Education and more recently with the U. S. Office of Education, retired from government service September 30, after completing 50 years of continuous work in the field of public education.

Born in Iowa, Mrs. Burdick received her early education in the public schools of Burlington and graduated from the University of Iowa with a B.S. degree. She also pursued advanced studies at the University of Chicago and Harvard University. In 1938 she received from Rutgers University the honorary degree of doctor of letters.

Prior to her service with the Federal Board for Vocational Education, which began November 17, 1917, Mrs. Burdick was successively a teacher in the Decorah (Iowa) High School; principal of the high school and superintendent of schools, Iowa Falls (Iowa); teacher of English, West High School, and director of vocational guidance, Des Moines (Iowa). For 5 successive years she was a member of the faculty for the summer session at Iowa State College, at Ames.

Mrs. Burdick, who has visited every state in the Union many times over and has visited many European and Latin American countries, Hawaii, and Alaska for the purpose of studying educational movements, has been a pioneer in the field of industrial education for girls and women.

In addition to her service in the educational field, she has been identified from time to time with activities carried on by city, state, and national welfare organizations. As director of the vocational-guidance work in the public schools of Des Moines, she was the first person to bear that title in any public-school system in the United States. Her long experience in work involving a knowledge of the social and economic backgrounds of education and industry has made her an authority in these fields.

Mrs. Burdick has made numerous surveys in the fields of general education, vocational education, and guidance, and is the author of a number of publications on these phases of education as carried on both in this country and abroad. Because of her interest in these fields, also, she has been a member of many state and national educational and professional associations. After her retirement, she plans to devote much of her time to the work of the Lalor Foundation (a foundation for the promotion, advancement, and dissemination of scientific research and the encouragement of the arts), of which she is vice-president.

Association News

♦ The Local Arrangements Committee of the A.V.A. are hard at work to get things ready for the convention which is to be held December 6 to 9 at Grand Rapids. This is what they have to say about the Convention City:

It's a part of a delegate's education to see the important industrial, historical, and entertainment features of the city in which the A.V.A. convention is held. This statement was emphatically declared by Mr. L. H. Dennis, national executive secretary of the A.V.A. in a meeting with the Grand Rapids planning committee.

With that thought in mind, the local committees are busy planning and making arrangements for the visitors to see the finest the city has to offer in educational and amusement values.

There is, first of all, the convention headquarters — the Hotel Pantlind, located on Monroe Avenue. This hotel is conveniently connected by tunnel with the Civic Auditorium where many of the meetings will be held. The entire ballroom, writing room, mezzanine lounge, and a portion of the lobby of the hotel will be utilized as exhibition space. A number of other hotels are located conveniently near the convention headquarters, in the downtown area.

The Civic Auditorium, already mentioned, is located on the bank of the Grand River, immediately adjacent to Campau Square, the heart of the downtown section. The structure has won national renown for its architectural beauty and commodious utility. More than 5,600 persons can be seated in the auditorium proper, a handsome room, with two balconies. The auxiliary auditorium, known as the Black and Silver Room, will seat 900 persons. Various other meeting rooms in the building will also be utilized. There is excellent and complete voice amplifying and stage equipment in each of these rooms.

Although Grand Rapids is justly termed "The Furniture Capital of the World," it is by no means a one-industry city. The community has widely diversified industrial operations, and manufactures many world-famous products, such as Bissell Carpet Sweepers, Tanglefoot Fly Paper, automobile body parts, refrigerators, paints and chemicals, Corduroy Tires, food products, and textiles. Opportunity will be afforded convention visitors to acquaint themselves with these industrial establishments.

Trips to local schools are also being arranged for. Few cities in the country have as genuine reason for pride in their schools as Grand Rapids. The school system is run on a nonpolitical basis, and maintains high educational standards. The George A. Davis Vocational and Technical High School is just a short walk from convention headquarters. Of course they will want to see the famous furniture museum and some of the many furniture factories. There is also an exceptionally fine art collection housed in the Grand Rapids Art Gallery, close to convention headquarters.

For especially fine scenic beauty, visit famous John Ball Park and Johnson Park, a few miles west and southwest of the downtown area. The rolling hills and wooded ravines of these two

DISSTON MAKES

the tool for every School Shop need

How to use tools? The right tools to use? Disston has answered these questions for many years . . . by making the tools most needed for school shop use.

Disston also issues charts for the school room and literature of an educational nature for the use of teachers in vocational instruction.

In addition, a service of repairing and refitting saws used as school equipment at nominal cost was adopted years ago in order that schools could get the best possible results from equipment used.

Write us about this Disston vocational service. Samples of Disston Hand Saw Chart, File Chart and Hack Saw Chart, and educational literature will be sent to instructors upon request.

HENRY DISSTON & SONS, INC., PHILADELPHIA, U. S. A.

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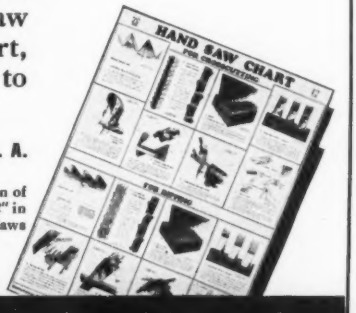
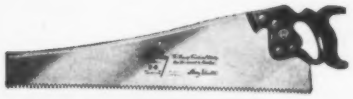


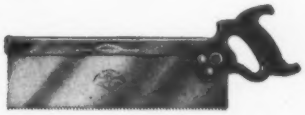
At right is shown miniature reproduction of Disston Hand Saw wall chart, 17" by 22" in size. Similar charts on Files and Hack Saws are available to instructors.

A Few Useful Disston Tools

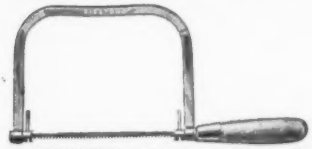


D-8 REGULAR PATTERN, Skew-Back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern in 26", differs in width of blade only.

D-7 REGULAR PATTERN, Straight-Back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern in 26".



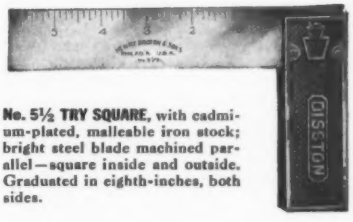
No. 4 BACK SAW, the handiest of all saws for cutting mitres, grooves, tenons, mouldings and other shop work requiring accuracy. 8 to 16" inclusive.



No. 10 COPING SAW, with frame of Disston Steel. Blades available for cutting wood, bakelight, celluloid, bone and composition board.

No. 76 MARKING GAUGE, made of hardwood, with graduated stem. Adjusting screw bears against brass plate in head to prevent wear.

No. 2 BEVEL, with Disston Steel blade; tempered; blued finish. Rosewood handle fitted with heavy brass face plates.



No. 5½ TRY SQUARE, with cadmium-plated, malleable iron stock; bright steel blade machined parallel—square inside and outside. Graduated in eighth-inches, both sides.

parks have been left in their natural wild state, reminiscent of the days when Indian tribes lived in the Grand River Valley and traded with Louis Campau, founder of the city.

Dr. Homer J. Smith, vice-president, in charge of industrial arts, reports that the Industrial-Arts Programs for the A.V.A. Convention at Grand Rapids are nearing completion. Plans for the several sessions have been made by Earl L. Bedell, George B. Cox, Roy G. Fales, Elbert E. Field, Louis V. Newkirk, and Arthur L. Reagh, whose names and places of work are well known.

The National Association of Industrial Teacher Trainers are planning a full day's session at the A.V.A. Convention, on Wednesday, December 6. There will be both morning and afternoon sessions. The Teacher Trainers and State Supervisors (Industrial Education) will have their customary joint luncheon on Wednesday. Professor V. P. McKinley of the University of Alabama is president of the former and Dr. B. H. Van Oot of the Virginia State Department of Education of the latter group.

Dr. Bess Goodykoontz, assistant commissioner of education, Washington, D. C., will be the main speaker at the industrial-arts luncheon on Saturday.

Professor Russell J. Greenly, chairman of trade and industrial education, gives us the following list of speakers and the subjects on which they will speak:

Walter B. Jones, chief, industrial education, department of public instruction, Commonwealth of Pennsylvania, Harrisburg, Pa. — "Implications for Industrial Education of the Findings of the New York Regents' Inquiry."

W. T. Bawden, head, department of industrial and vocational education, Kansas State Teachers College, Pittsburg, Kans. — "The Outlook in Teacher Training in Teachers' Colleges and Universities."

Clyde H. Wilson, professor of industrial education, University of Tennessee, Knoxville, Tenn. — "Proposed Amendments to the Smith-Hughes and George-Dean Acts."

Verne C. Fryklund, associate professor of vocational education, Wayne University, Detroit, Mich. — "Report on the National Survey of Industrial-Arts Teacher Training."

P. G. Frasier, research specialist, state board of vocational education, Des Moines, Iowa. — "What Recent Graduates of All-Day Industrial Classes are Doing — Highlights from a Follow-up of 4,000 Graduates of 1938."

John Reid, secretary, Michigan Federation of Labor, Lansing, Mich. — "Human Relations Needs in Vocational Training" (as seen from the standpoint of labor).

Harry J. Kelley, personnel director, American Seating Company, Grand Rapids, Mich. — "Human Relations Needs in Vocational Training" (as seen from the standpoint of an Employer).

Wm. F. Rasche, assistant director and principal, Milwaukee Vocational School, Milwaukee, Wis. — "Some Problems and Difficulties to Be Met by the School in Developing Human Relations in Vocational Training."

E. F. Riley, president, North Dakota State School of Science, Wahpeton, N. Dak. — "Need for Trade Training for New Occupations."

C. R. Smith, president, American Airlines, Inc., Chicago, Ill. — Subject to be announced.

George H. Pedersen, general chairman, International Association of Machinists and Chairman, General Chairman's Association, Chicago, Milwaukee, St. Paul, and Pacific Railroad, Milwaukee, Wis. — "The Golden Rails — The New Era in Railroading and Its Contribution to Our National Welfare."

Bennett M. Livezey, general superintendent of the South Works of the Carnegie Illinois Steel Corporation. — "Co-ordination from the Point of View of the Employer."

Wilson Frankland, vice-president, Steamfitters' Protective Association, Local 597, and member of the Board of Education, Chicago, Ill. — "Co-ordination from the Point of View of Labor."

C. L. Wetzel, supervisor of trade extension education, Hadley Vocational School, St. Louis, Mo. — "Co-ordination from the Point of View of Supervisor of Part Time and Evening Schools."

D. C. Courtright, principal, Cleveland Trade School, Cleveland, Ohio. — "A Course for Automotive Service Managers and Service Salesmen."

Dave Wallace, president, Chrysler Sales Division of Chrysler Corp., Detroit, Mich. — "Illustrated Lecture and Demonstration of Superfinish on Automotive Parts."

Charles Engelhard, of Charles Engelhard, Inc., Newark, N. J. — "Exhaust Gas Analysis Applied to Tune-up Service."

C. H. Lawshe, dean, Mechanic Arts High School, Evansville, Ind. — "Curriculum Research."

John Olney, American Type Founders, Grand Rapids, Mich. — "School Shop Equipment."

Ralph W. Polk, supervisor of printing instruction, Cass Technical High School, Detroit, Mich. — "Printschool Typography."

Arthur E. Ormsbee, Commonwealth Printing Company, Grand Rapids, Mich. — "Industry Relations."

Panel Discussion Subject: "Application of the Fundamental Concepts in the Establishment of Vocational Education Courses for Girls and Women."

Leader:

O. D. Adams, State Director, State Board for Vocational Education, Salem, Oregon.

Members:

Mrs. Lydia Leet, Related English, Girls' Vocational Schools, Detroit, Mich.

Miss Alice E. Watkins, Distributive Education, Theodore Ahrens Trade High School, Louisville, Ky.

Miss Grace A. Gilkey, Director, David Hale Fanning Trade School for Girls.

Mr. E. O. Bartlow, Occupational Research, Toledo, Ohio.

Miss Florence L. Rittenberg, Co-ordinator, Jane Addams Schools, Trade Training for Girls, Cleveland, Ohio.

Dr. Ronald W. Kent, Assistant Director, Essex County Vocational Schools, Newark, N. J.

♦ The Vocational Conference held Thursday, October 5, at Kansas State Teachers College, Pittsburg, was attended by the following local directors of Kansas evening classes: R. R. Reed, Salina; E. W. Westgate, Atchison; H. G. Leet, El Dorado; Ray E. Williams, Parsons; Henry A. Parker, Paola; Carl Holman, Arkansas City; J. V. Hamilton, Chanute; J. W. Jarrett, Hutchinson, and J. C. Woodin, Wichita. Other Kansas and out-of-state men attending the Four-State Industrial and Vocational meeting sat in on this day. Among these were: L. K. Covelle, and E. F. Daniels, State Supervisors of Trade and Industrial Education in Oklahoma and Missouri, respectively, and R. B. McHenry, Local Director and State Teacher Trainer, Ft. Smith, Ark.

Dr. Charles A. Prosser of Dunwoody Industrial Institute, Minneapolis, Minn., opened the meeting by suggesting that local directors should supply instruction concerning social legislation to those attending evening classes. He distributed samples of the mimeographed material that evening-school students at Dunwoody receive. Dr. Prosser also talked on the matter of the Wage and Hour Bill, and the apprenticeship program.

L. S. Hawkins of the U. S. Office of Education talked on the subject of apprenticeship and gave the group many good suggestions on the topic. The remainder of the time was spent in answering questions from the group. C. E. Rakestraw of the U. S. Office of Education, Dr. Prosser, and members of the group offered answers to the questions asked.

At 6:30 the group met at a dinner meeting. C. M. Miller acted as chairman. At this meeting C. E. Rakestraw gave his talk on the use of the advisory committee in vocational education.

♦ The Industrial Arts Club of Westchester County held its first meeting this year at the Bronxville High School, Yonkers, N. Y., on October 6.

It was well attended. At this meeting the committees for the new school term were named, and plans for the year's work were discussed. The next meeting will be held at Pleasantville N. Y., on November 10.

♦ The first meeting of the Massachusetts Industrial Education Society was held at the Hotel Falmingo, Boston, Saturday, October 14.

After the dinner, Mr. Ray M. Hudson, Member of the New England State Committee on Labor, spoke on "Youth and New England Industry." Mr. Hudson pointed out some of the ways in which his committee is aiding youth to find its place in industry, punctuating his talk with a recital of trends of industries now apparent in New England.

The new officers for the coming year are: President, Gustave A. Larson, Malden; Secretary, Joseph Rains, South Boston; Treasurer, A. Irving Dodge, Lexington.

The following committee chairmen were appointed: *Program,* Rodger M. Tolman, Winchester; *Education,* Edward H. Temple, Belmont; *Social,* Americo Ventura, W. Somerville; *Membership,* Paul H. Leslie, Lawrence; *Press,* Otis W. Leary, Winchester; *Research,* Louis A. Van Ham, Milton; *Ex Officio,* Edward Terrenzi, Belmont.

The next meeting of the society will be held with the New England Industrial Education Society at Portland, Me., October 3 and 4. — *Otis W. Leary.*

♦ The teachers of industrial arts in Chicago organized a club early in 1939 for the promotion of professional interest and fellowship.

This fall, unit meetings are being held at which teachers discuss their individual problems and ideas related to the particular area under consideration. In addition, general meetings are planned for correlating the work with other studies, and discussing the problems of the industrial-arts laboratory as a whole.

The club is managed through representatives from each of the high-school districts of the city. The industrial-arts laboratory in the Chicago high schools is under the direction of Dr. Lewis V. Newkirk. — *L. S. Huber.*

♦ The Industrial-Arts Section of the Minnesota Education Association, Southwestern Division, held its meeting at 1:30 p.m. at the High School at Mankato, Minn., on Thursday, Oct. 19, 1939.

Lawrence Picha, Instructor of Woodworking, High School, Kenyon, was chairman on this occasion.

Emil Ludtke, instructor of industrial arts, Mountain Lake, gave an excellent demonstration on ring casting. He also showed and explained how an electric welding outfit can be made in the school shop, which will answer most purposes on small projects.

Robert Bryan, Co-ordinator of Faribault, described how the newer phases of vocational education, such as the training for the miscellaneous trades and distributive trades, is and can be applied in the smaller community.

Gordon O. Voss, state supervisor of trade and industrial education, St. Paul, gave an interesting picture of "Industrial Arts in Minnesota."

John J. Metz, Editor of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, spoke on the subject, "Looking Ahead in Industrial Arts."

A vote of thanks was extended to A. L. Thiede, Supervisor of Industrial Education at the State Teachers College, for assuming the major share of arranging for the program.

Maurice J. Nelson had charge of an excellent exhibit of industrial-arts projects which the instructors from the various school had submitted.

♦ The annual convention of the Wisconsin Industrial Arts Association was held at Milwaukee on Thursday, November 2, at 2:00 p.m. George Guenther of Wausau was chairman of the meeting.

The main address was delivered by Dr. Homer J. Smith, Professor of Industrial Education, University of Minnesota. His topic, "Our Broadening Responsibilities in Industrial Arts" covered an extensive outline containing 77 items. He had these arranged under 7 different headings, in order to facilitate the asking and answering of

(Continued on page 21A)

DIXON TOOLS for METAL ARTS

An assortment of Dixon hammers for raising, forming and planishing of metals is the most essential equipment in any craft shop. Dixon hammers are the result of more than 70 years' experience, and distinguished for correct design, finest quality and highly polished ends. Our Free Consulting Service will gladly assist you in selecting the most practical hammers for your requirements.

Our arts and crafts catalog, containing our complete line of tools and supplies, is sent free to industrial arts teachers.

We invite you to visit our display of projects, tools, supplies and designs at the A.V.A. Convention.

WILLIAM DIXON, INCORPORATED 32-34-36 East Kinney Street NEWARK, NEW JERSEY

(Continued from page 18A)

questions for which time was allotted at the end of his speech.

In the business section, the secretary was asked to send a telegram, expressing the best wishes of those present for a speedy recovery, to Frank V. Powell, Assistant Superintendent, State Department of Public Instruction at Madison, who has been quite ill for some time.

Officers for the coming year are: President, George Guenther; Vice-President, R. R. Bedker, Wauwatosa; Secretary-Treasurer, Roy R. Van Duzee, West Allis; Committeeman representing past presidents, Leo Ebben, Kohler; Committeeman at large, O. O. Wakeman, Fond du Lac.

Sectional meetings on electricity, mechanical drawing, general metals, general woodworking, industrial mechanics, printing, and on the one-man industrial shop were held at the Milwaukee Vocational School on Friday afternoon.

Answers to Questions

FINISHING AND POLISHING ALABASTER

1034. Q.: What is the best method of polishing alabaster? Is there a polishing compound that it is possible to use that will not change the color of the stone? Kindly suggest a finish. — *J. R. W.*

A.: Alabaster blocks or blanks should be kept stored under clean water in glass- or enamelware to avoid iron or other metallic stains. It is a form of lime sulphate as generally sold to the trade but may vary in the case of local veins which occur in many sections.

For turning purposes it is well to roughly shape the ends square with grinding or by filing so that wooden blocks can be fitted over them, in which case they can then be readily checked up in the lathe for turning. Provide a means of running a slow and fine stream of water through a small rubber tube which can be fastened to the end of the lathe tool with a rubber band. This will do away with the objectionable dust and smell which generally accompanies this work, and at the same time gives much better results than when cut dry. Run the lathe at 600 to not over 1200 r.p.m. for turning operations.

Tools for this work should be very hard tempered, in which case old files of various shapes can be ground to give tools fitted to a scraping cut. Riffling files can be used on the finish profiles, being careful to keep them well brushed out as this stone is very soft and scores easily. When cut down to finished detail, use No. 4/0 speed-wet sanding paper and water, to sand for finish as for wood turning. Back up the paper with a suitable felt pad when necessary. Keep the work well flushed off with the water stream during this operation to avoid scratches.

Change the sandpaper for FFF pumice stone and felt block, run while wet and bring to a clean surface. For the final polish use sifted silex, heavy cotton cloth, and an ivory-soap solution made quite thick. Speed up the lathe, apply the rag strip wet with solution and abrasive and polish for finish. Wash clean with a sponge and give a dry polish with a dry cloth while running at the highest safe speed, remembering that this stone has no fiber strength and hence centrifugal force must be controlled at all times.

To color alabaster, use French ochre, any of the umbers, in fact any of the dry pigment colors by mixing with the wet pumice stone when finishing with the felt, FFF pumice and water, or soap solution.

Do not use any of the finishes usually applied to wood surfaces when polishing alabaster. The soap and FFF pumice or silex will give one type of fine polish, while the use of some whiting in place of straight pumice will give something equally pleasing and different.

Pieces which cannot be handled on the lathe can be wet buffed or hand rubbed as for wooden surfaces finished in lacquer or varnish. — *Ralph G. Waring.*

New Publications

Oxyacetylene Welding

By Robert J. Kehl and Morgan H. Potter. Cloth, 130 pages, 5¾ by 8½, illustrated. Price, $1.25. Published by American Technical Society, Chicago, Ill.

A thorough description of the processes and techniques of light and heavy steel and other metal welding in the various positions in which this work must be done.

The book contains thirteen chapters in which the welding of the various metals, welding in automobile-repair work, jig design for welding, and costs are discussed.

Getting a Job in Aviation

By Carl Norcross. Cloth, 374 pages, 5⅞ by 8¼, illustrated. Price, $2.50. Published by McGraw-Hill Book Company, New York, N. Y.

A majority of the youth of our country are air-minded. Many young men see themselves as behelmeted heroes of the airways, while the

(Continued on page 22A)

A model shop at the Temple, Texas High School. Modern, well-illuminated, and equipped with serviceable Wallace machines,—the Wallace No. 8 Universal Saw, No. 10 Jointer, No. 16 Band Saw, No. 18 Shaper, and No. 66 Lathe.

NO FINER MACHINES AT *ANY* PRICE

You can spend *twice* the amount of money for woodworking equipment, but you can buy no finer woodworking machines than Wallace models.

These direct-drive Universal Saws, Jointers, Bandsaws, Grinders, Lathes, Shapers and Mortisers are quality-built from stem to stern,—incorporate only the *best* materials and workmanship.

They guarantee lasting economies in your shop,—and provide *practical* industrial art facilities on the same machines used by 75,000 men who are "sawing wood for money." Write today for quotations on the tools you need.

AN INVITATION

Booth No. 22,—that is the space assigned to J. D. Wallace and Company for the A.V.A. Convention in Grand Rapids, Dec. 6 to 9, 1939.

Make this space your meeting place and headquarters at the Convention. And be *sure* to see the working demonstrations of Wallace machines.

J. D. WALLACE & COMPANY

140 S. California Ave. Chicago, Ill.

(Continued from page 21A)

high-school girl pictures herself as an efficient stewardess skimming along high above the clouds in a beautifully appointed airplane.

In this book the author points out who is fitted for the many and various jobs connected with this form of transportation; also how these jobs may be secured and what they demand of the worker.

The book is divided into five parts. The first of these discusses the jobs in the air lines—pilots, mechanics, dispatchers, radio operators, meteorologists, business jobs, and stewards. In the second part the jobs connected with private commercial flying are discussed. The third is devoted to the jobs in governmental service, the fourth to the jobs in engineering and manufacturing, and the fifth to the training required for the various jobs and how and where it is obtainable.

Tool Making

By C. B. Cole. Cloth, 413 pages, 5⅞ by 8½, illustrated. Price, $3.50. Published by American Technical Society, Chicago, Ill.

A book for the apprentice and the student learning the toolmaker's trade.

In it are discussed the various hand and power tools, and the measuring and layout tools used; the heat treating of steel and the design and making of special tools, jigs, fixtures, dies, and the like.

A number of useful tables have been placed in the appendix.

Essentials of Alternating Currents

By W. H. Timbie and H. H. Higbie. Cloth, 377 pages, 5⅛ by 7¼, illustrated. Price, $2.25. Published by Wiley and Sons, Inc., New York City.

This is the second edition of a book which deals with essential information the workers on A.C. appliances should have.

It is written in simple language, requires a knowledge of common arithmetic only, and is the result of years of experience in teaching short unit courses to the men in the trade, and preparing men for the trade.

Woodcraft

By Bernard S. Mason. Cloth, 580 pages, 6½ by 9⅜, illustrated. Published by A. S. Barnes and Co., New York City.

A book to delight almost every boy. The subject matter is divided into three parts.

In the first of these, the author, under the general heading of "Campcraft" describes all kinds of shelters that may be used on the trail, such as tepees, bark wigwams, and lean-tos. In this part, beds, firecraft, and hints for using the fires for toasting, roasting, and barbecuing also are given.

Part Two is devoted to woodcraft. Under this title are found many hints for making caches and a great deal of information about barkcraft, rope and cordage as applied in woodcraft, making and using various kinds of knives, and the making of camp furniture and camp accessories.

Part Three is entitled "Crafts of the Woods." This is replete with facts on Indian lore, and gives explicit directions about making calumets; rawhide; buckskinning; horn, feather, and gourd work; tin-can craft, and totem poles.

Farm Management

By Robert R. Hudelson. Cloth, 396 pages, 6 by 8⅝, illustrated. Price, $1.80. Published by The Macmillan Company, New York City.

A high-school text and reference book which deals with the three important phases of farm management; namely, organization, operation, financing and accounting.

Such subjects as choosing the farm, planning the cropping system, fields, buildings, pasture system, and power equipment are all discussed under the topic of "Organization."

Under "Operation" are treated such subjects as: production hazards, working programs, markets, adjusting production to demand, and marketing.

"Financing" and "accounting" cover such items as ownership, tenancy, insurance, budgeting, records and accounts, and checking efficiency.

Decorative Plant Forms

By Herbert W. Faulkner. Paper, 12¾ by 9½. Price, $1.50. Published by Harper and Bros., New York City.

Thirty plates of plant forms intended for teachers, painters, craftsmen, textile designers, carvers, ornamental metalworkers, stencil makers, designers of batiks, wallpapers, and ceramics.

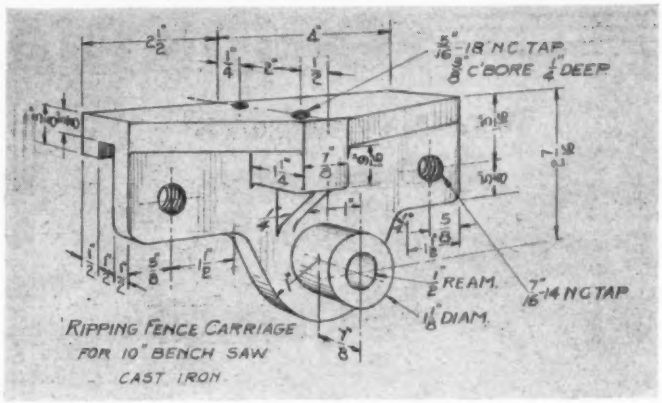
These plant-form designs are not conventionalized, this being left to those who want to adapt the natural forms to the patterns which they may need.

Squared tracing papers is provided in the book, with ⅛-, ¼-, and ½-in. squares to facilitate the adaptation of the designs to various sized spaces.

CHRISTMAS SEALS

Help to Protect Your Home from Tuberculosis

A PROBLEM FOR CLASSROOM USE

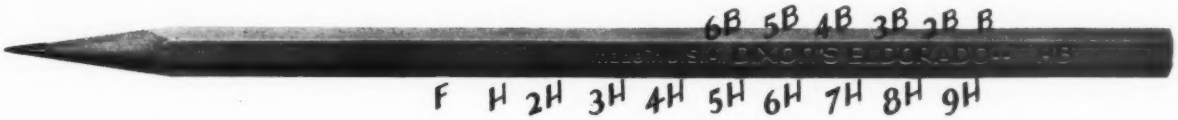


HERE is the first in a series of mechanical drawing problems for school use. This and those that come later can be used by instructors for classroom assignment over the school season. Free blue print of each solution from drawing made with *Typhonite Eldorado pencils, may be secured to simplify the instructor's work. Write to School Bureau, Pencil Sales Department 128-J12, Joseph Dixon Crucible Company, Jersey City, N. J. The blue print will show you that Typhonite Eldorado's clean, sharp, opaque lines are ideal for blue printing.

PROBLEM: Students are to draw the correct orthographic views. Front view of full sections.

SOLUTION—FREE: A blue print showing the solution of the problem will be sent to any teacher requesting it. This solution may be passed around the class for comparison with students' drawings, thus simplifying instructors' work.

***NOTE: Typhonite is a new form of natural graphite used exclusively by Dixon in making leads for Eldorado, the Master drawing pencil. Typhonite consists of extremely minute particles produced by a whirlwind or typhoon of dry steam.**



Metal Projects Index

By William J. Becker. Paper, 34 pages, 6⅜ by 9¾. Price, 60 cents. Published by H. W. Wilson Co., New York, N. Y.

Over 6,000 projects for making more than 775 different objects are indexed in this book. The metal projects have been indexed from ninety widely read books and pamphlets, for the past ten years, from six magazines of wide circulation among industrial-arts instructors.

The book also includes references to articles on enameling, Keene cement, plastics, leather, designs, celluloid, and gem cutting.

Millet Tilled the Soil

By Opal Wheeler and Sybil Deucher. Cloth, 96 pages, 8¼ by 11¼, illustrated by Dorothy Bagley. Price, $2.50. Published by E. P. Dutton and Co., Inc., New York City.

Teachers and students of art and industrial arts will be delighted with this simple but inspiring story of the life and struggles of the man who painted *The Angelus, The Sower, The Gleaners,* and many other rural scenes.

The book carries many small illustrations depicting intimate happenings in the life of Millet.

Reproductions of a number of his masterpieces also grace its pages.

News Notes

♦ "Building a Home with Western Pines" is the title of a new motion picture film, which has just been released by the Western Pine Association. This is the third talkie movie in a series of industrial films made by the promotion department of the Association on behalf of the mills, factories, and dealers, who produce, handle, and deal in lumber and related products manufactured from Idaho White Pine, Ponderosa Pine, Sugar Pine, and associated species growing in the Western Pine region.

The new film is an interesting step-by-step portrayal of the actual building of the Western Pine Home at the Golden Gate International Exposition on Treasure Island in San Francisco Bay.

An added feature of the latest Western Pine film is the 130 ft. of natural color (Kodachrome) in the closing scenes, which shows the beautiful finishing treatments on the pine woodwork and the harmonious furnishings in each room in the completed home.

A number of 16-millimeter prints of the film are now available. These will be loaned free for use by responsible parties and organizations who wish to arrange for showings of the picture. The 16-mm. film is all on one 1200-ft. reel; it is noninflammable and requires about 25 minutes' running time. A portable sound projector is necessary for this size film.

Requests for bookings are invited by the Western Pine Association, Yeon Bldg., Portland, Oreg., from whom complete information regarding the film may be obtained.

♦ The administration of undergraduate and graduate work in industrial arts has been transferred from the Division of Engineering at Iowa State College, Ames, Iowa, to the Vocational Education Department.

This transfer was made because industrial-arts work logically belongs in the general program of teacher training of the college.

♦ New York University has awarded 39 fellowships and scholarships in safety education for the academic year just started. The winners will spend a full year at New York University preparing for leadership in school and public safety work.

♦ United Air Lines have just announced that it will again award four scholarships in the Boeing School of Aeronautics this year. The four awards have a total tuition value of $11,500.

Each award consists of one of the following nonflying courses for which the candidate is eligible, plus 10 hours of instrument flight training in the Link trainer, and 20 hours of dual and solo flight instruction.

Airline Operations and Engineering	Duration 24 months
Air Transport Engineering	Duration 24 months
Air Technician	Duration 9 months
Airline Meteorology	Duration 9 months
Airline Mechanic and Operations	Duration 18 months
Airline Mechanic	Duration 12 months

A prerequisite of the Air Transport Engineering course is the completion of two years in an accredited college or junior college. A prerequisite of the Airline Technician and Airline Meteorology courses is graduation from an accredited aeronautical, civil, electrical, or mechanical engineering college. In the other three courses, graduation from high school is sufficient.

♦ An evening course in silk-screen printing will be given from 7 to 9 p.m. at the New York Evening School of Industrial Arts, 257 West 40th St., New York City. Mr. J. I. Biegeleisen will be the instructor.

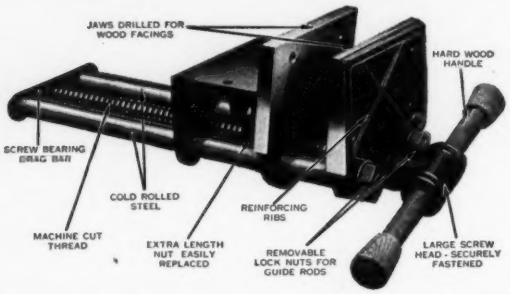
♦ To acquaint the general public with current problems and the latest developments in various fields of accident control, the New York University Center for Safety Education will conduct a weekly series of thirty-one free forums during which authorities on safety will speak. Beginning Wednesday, October 26, 6 p.m., in Room 985 of the University's School of Education Building, W. Fourth and Greene Sts., each forum will last one hour and will be concluded with a question period. No tickets of admission will be required. They will continue weekly until May 22, 1940.

♦ On September 18, the National Committee recently appointed by the United States Office of Education to consider the contribution that industrial arts can make to a curriculum for pupils of secondary-school age whose achievement records and individual interests do not indicate that either a college preparatory course or a course

(Continued on page 24A)

COLUMBIAN VISES

Woodworkers'


JAWS DRILLED FOR WOOD FACINGS
HARD WOOD HANDLE
SCREW BEARING DRAG BAR
COLD ROLLED STEEL
REINFORCING RIBS
MACHINE CUT THREAD
EXTRA LENGTH NUT EASILY REPLACED
REMOVABLE LOCK NUTS FOR GUIDE RODS
LARGE SCREW HEAD - SECURELY FASTENED

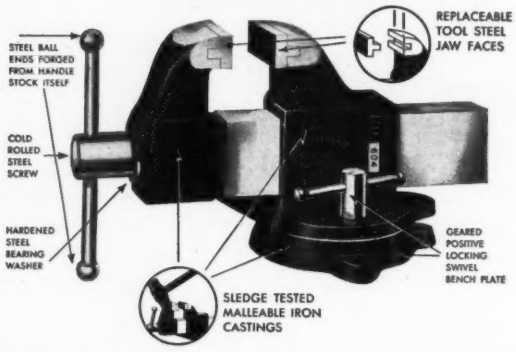
COLUMBIAN Rapid Acting Woodworkers' Vises are designed for school and industrial shops where time is an important factor. Especially adaptable where large changes in jaw opening must be made frequently.

Simple rapid acting mechanism consists of a bronze half-nut operating in the groove produced by milling off a section of each thread for the length of the screw. A slight turn of the handle engages the threads of the nut and screw, and a half turn tightens the vise on the work.

Columbian Continuous Screw Woodworkers Vises are simple in design, rugged in construction and practically "fool-proof." They can be furnished with either wood or steel handles.

The Columbian Line also includes Combination Pipe Vises, Hinged Pipe Vises, Garage Vises, Bench Anvils, and "C" Clamps. Write us for complete catalog and name of the Hardware or Industrial distributor carrying Columbian Vises in stock.

Machinists'


REPLACEABLE TOOL STEEL JAW FACES
STEEL BALL ENDS FORGED FROM HANDLE STOCK ITSELF
COLD ROLLED STEEL SCREW
HARDENED STEEL BEARING WASHER
GEARED POSITIVE LOCKING SWIVEL BENCH PLATE
SLEDGE TESTED MALLEABLE IRON CASTINGS

COLUMBIAN Malleable Iron Machinists' Vises are designed to give the service required of quality tools. Guaranteed not to chip, crack, or break.

JAW FACES of hardened tool steel, pinned securely so that they will not come loose in use, can be replaced.

STEEL SCREW and MALLEABLE IRON NUT are designed to give maximum strength. A hardened steel thrust washer under the screw head prevents wear and eliminates end play. STEEL BALL ENDS on the handle are forged from the handle stock itself, and will not come loose.

SWIVEL BASE VISES are locked in any position by a forged steel lock bolt, and steel clamping nut.

BASES on all Columbian Machinists' Vises are machined flat to permit solid mounting and eliminate cutting bench tops.

THE COLUMBIAN VISE & MFG. CO.
9017 Bessemer Ave. CLEVELAND, OHIO

(Continued from page 23A)

in a highly skilled or technical occupation would be advisable, met in Washington, D. C., for a three-day conference.

The rather general lack of adequate and proper curriculum provisions in our public schools for the individuals indicated for study by the National Committee, has long been recognized by school administrators and teachers as a serious problem in the educational adjustment of youth. In practically every discussion of this problem, reference is made to industrial arts as a potential factor in any effective program for the education of these pupils. The general interest manifested in industrial arts for this particular purpose is doubtless based, partially at least, upon the belief that educational experiences involving the manipulation of concrete materials commonly used in construction work, together with the study of these materials, the changes made in them, and the organization of society for producing commodities from them, will be a desirable contribution to a program for the adjustment of these individuals to the society in which they will live.

The conference meeting of the committee was only a step in its program of work looking to the formulation of a report which will make suggestions as to the selection and organization of activities in and connected with the industrial-arts area, that have potential values for the education of this comparatively large number of secondary-school pupils. The specific work of the conference included:

First, outlining certain assumptions basic to the formulation of an industrial-arts program for the kinds of pupils with which the study is concerned. The conference held that industrial arts can provide educational experiences that call for self-expression in concrete material media that have a natural appeal to boys and girls; that the special needs of any pupils of the kinds indicated can be cared for very largely in the regular industrial-arts courses — rather than in special courses — by provisions for differentiation in individual pupil activities; that the selection of educational experiences in the industrial-arts area be made upon their relation to life experiences in accordance with the interest and ability levels of the pupils; that while the educational experiences in industrial arts are for general education objectives, there should be some provisions before school leaving for industrial-arts work of an intensive type which will contribute to assets for employment; that industrial-arts work, including manipulative work in the shop and laboratories, visits to industrial plants, and assigned readings in related subjects, be planned to realize in full measure the value they have for social objectives in education.

The second step in the work of the conference was listing tentative activities in industrial arts and outlining suggestions for their instructional organization and for the administration of the program. The final step was outlining procedures to be followed by individual members during the next few months in carrying out assignments for study and report.

The list of the personnel of the National Committee for prosecuting the study is as follows:

Personnel of Industrial-Arts Committee

Earl L. Bedell — Director, Department of Vocational Education, Board of Education, Detroit, Mich.

Roy G. Fales — Supervisor of Industrial Education, State Department of Education, Albany, N. Y.

Charles F. Bauder — Director of Industrial Arts, Public Schools, Philadelphia, Pa.

Frank C. Moore — Supervisor of Industrial Arts, Board of Education, Cleveland, Ohio.

Prof. Glen D. Brown — Head, Department of Industrial Education, University of Maryland, Baltimore, Md.

John R. Ludington — Professor, Industrial Arts Education, Ball State Teachers College, Muncie, Ind.

Elmer W. Christy — Director of Industrial Arts, Public Schools, Cincinnati, Ohio.

Dr. Homer J. Smith — Professor of Industrial Education, University of Minnesota, Minneapolis, Minn.

Dr. Walter B. Jones — Chief, Department of Industrial Education, State Department of Education, Harrisburg, Pa.

Miss Clara A. Martin — Senior High School, Glens Falls, N. Y. Home address: 18 Sherman Avenue, Glens Falls.

Harry E. Wood — Director of Fine and Practical Arts, Public Schools, Indianapolis, Ind.

L. S. Hawkins — Chief, Trade and Industrial Service, Office of Education, Washington, D. C.

Maris M. Proffitt — Chairman, Educational Consultant and Specialist in Industrial Education, Office of Education, Washington, D. C.

New Products

Zipper-Type Drawing-Instrument Case

The Slide-Fastener or "Zipper-" Type Case for drawing instruments is a decided innovation. It

SLIDE FASTENER INSTRUMENT CASES
(Zipper Type)
Dietzgen Improved Slide Fastener Instrument Case (opened)
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is marketed by the Eugene Dietzgen Co., Chicago, manufacturers of drafting and surveying instruments. The case provides beauty of appearance,

An Invitation

To all supervisors and shop class instructors attending the A.V.A. Convention we extend a cordial invitation to visit the Starrett Exhibit where you will find a complete display of Starrett Tools designed especially for shop class use.

BOOTH *Number* ONE

THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

World's Greatest Toolmakers—Manufacturers of Hacksaws Unexcelled—Steel Tapes, Standard for Accuracy—Dial Indicators for Every Requirement

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convenience of use, and security to the contents of the case. It is available for the majority of Dietzgen drawing instruments; and is furnished in two materials: genuine leather, lined with silk velvet; and strong Fabricoid (facsimile leather), lined with soft velvet.

Diamond Wheel Contour Grinder

A fixture, the No. 155 Diamond Wheel Dresser is now available for use with the Stanley Contour Grinder. This fixture provides an inexpensive means of truing and dressing grinding wheels or points. A ring on the bottom of the

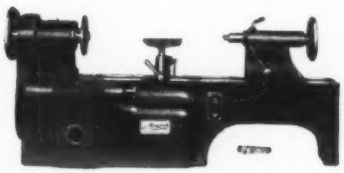
dresser fits in counterbored hole on table top of the grinder. A large knurled adjusting screw is provided for setting dresser. The holder in which the diamond (¼ to 1/3 carat) is mounted, is adjustable. A small knurled screw is provided for accurate setting of diamond and to regulate depth of cut.

The Stanley Contour Grinder is used by tool and diemakers for finishing dies, gauges, templates, and special shapes. Its motor is held in a holder which can be adjusted from 90 to 45 degrees. The mounted point, wheel, or rotary file projects through the table.

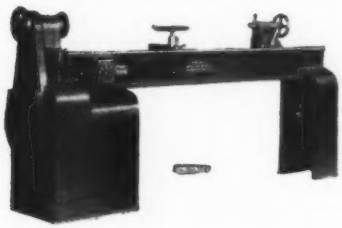
Information on this contour grinder will be gladly given by the Stanley Electric Tool Division, New Britain, Conn.

Multi-Speed Wood-Turning Lathe

The AMERICAN SAW MILL MACHINERY CO., of Hackettstown, N. J., announces a new line of wood-turning lathes, capable of an infinite number of speeds from any desired maximum down



to zero. The variable speed transmission and motor is mounted below the lathe bed. The spindle is driven by a multiple V-belt drive from the transmission unit. The standard spindle speed



range is from 0 to 2400 R.P.M. Other speed ranges can be furnished if desired. A conveniently placed dial shows the speed at which the spindle is revolving.

The headstock spindle is mounted in two precision preloaded ball bearings running in a bath of oil, with all movable parts, with the exception of the faceplate and live center, totally enclosed. The lathes are available either as floor models or bench models.

This lathe was developed to meet the rigid specification set up by the Brooklyn Technical High School of New York, who have already installed sixty units.

Portable Bench Grinder

The Speedway Mfg. Co., Cicero, Ill., manufacturers of portable electric tools for over 30 years, announces a new portable bench grinder

low in price, modern in design, and versatile in use.

The new "119" comes in a modern, streamlined cast housing, and is finished in rich blue crackle and lacquered white metal. It is an all-around, handy, fully guarded grinder, which sets firmly on four rubber feet and is ideal for sharpening tools, knives, or other miscellaneous grinding.

It comes equipped with a 110-volt a.c. motor, one fine grinding wheel and one coarse, and a six-foot cord.

"Handy" Portable Drawing Table

A portable folding drawing table with six features and a hundred uses is announced by the EUGENE DIETZGEN CO., of Chicago, manu-

(Continued on page 27A)

The APPROACH to Aviation

As a great new industry, aviation is calling for vocational education leading to it. Thousands of boys in school today are vitally interested in entering the various phases of aviation, and the building of model airplanes under proper supervision is the natural gateway to this training.

Megow model kits serve the teacher well, offering endless variety, accurate plans and progression . . . and in building them, one becomes thoroughly trained in the basic fundamentals of aerodynamics.

Write for full information

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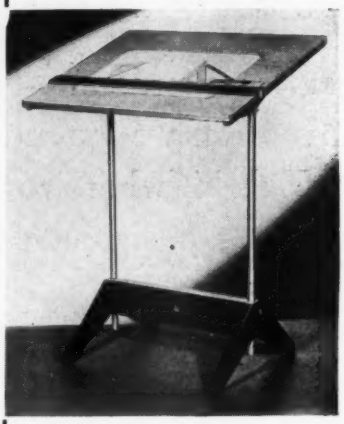
A STURDY STAND FOR MECHANICAL DRAWING AND ART STUDENTS



A complete portable drawing unit is provided in this economical piece of equipment, equipped with parallel ruling straightedge with Bakelite blade. Board tilts from vertical to horizontal, five height adjustments from 28½" to 33". Ideal for classroom or home use.

Drawing tops 21" x 26", 25" x 31" and 25" x 37", in three combinations of finishes and equipment; price ranges from $8.75 upward.

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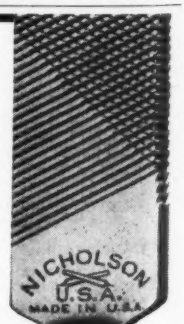
LIGHT MACHINES FOR INDUSTRY

Fast! Accurate!

Controlled Serrations,* an exclusive Nicholson feature, means quick results when your students have a fast metal-removing job to do.

Controlled Serrations* mean more accurate filing, too! Nicholson Files hold to the line of work better and push easier—make filing easier for your students.

Let your students learn with Nicholson Files — the favorites of Industry. Nicholson File Company, Providence, Rhode Island, U. S. A.



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William E. Warner, *Consulting Editor*

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176 pages, 8½ x 11, cloth, $1.60

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Examine these books at the Grand Rapids A.V.A. Convention, Booth 27, or send for examination copies on approval.

INTERNATIONAL TEXTBOOK CO.
Scranton, Pennsylvania

(Continued from page 25A)

facturers of drafting and surveying supplies. The Handy portable folding table is strong and sturdy, yet it can be lifted easily with one hand. It folds up and unfolds like a camp stool, and sets almost automatically to the right drawing position. A finger touch locks the board at the desired position. There is adequate knee room, and the

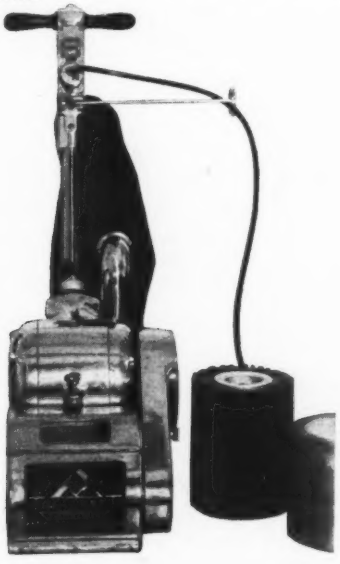
board is equipped with a pencil and instrument rack across the top. The Handy drawing table folds to 3 in. thickness and it stows away easily. The 20 by 26-in. pine drawing board is permanently attached to the hardwood supporting frame.

Tri-Craft Floorworker

The Tri-Craft Floorworker is a new multi-purpose floor machine recently announced by Porter-Cable Machine Co., Syracuse, N. Y.

This machine is designed for use on wood, marble, terrazzo, linoleum, tile, and other floors. It will sand new floors and remove old finishes, steel wool, clean, and polish.

It is a drum-type machine; therefore, it works with the grain or in straight lines. This makes an easy task for even the inexperienced operator to finish a floor evenly and beautifully with no fear of leaving swirls and cross-grain scratches.



Various drums are available with this new machine, i.e., sanding, steel wooling, tampico drum brush, and lambs wool. Changing drums, takes less than a minute. Various finenesses of steel wool are available.

Powerful New Low-Cost Shaper

Many unusual features are found in the new low-cost shaper just announced by the Delta Manufacturing Co., of Milwaukee, Wis. This new tool will shape, form, or mold any type of work from the smallest moldings to heavy production work. Some of the outstanding features

of this unit include: Large husky spindle, lubricated for life, with full 3-in. travel. This is made of manganese steel, and can be instantly replaced with ½- or 5/16-in. spindles.

It is equipped with a 27 by 28-in. table which can be enlarged to 27 by 36 in. by adding an extra wing.

The fence is fully adjustable. The rear half of the fence can be adjusted without disturbing other settings. A convenient rip fence is available for performing many operations that are difficult with ordinary fence.

The motor is completely enclosed in a sturdy cabinet. It is light enough to be portable, heavy

(Continued on page 29A)

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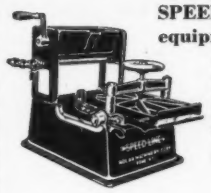

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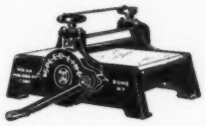

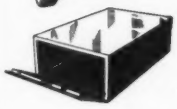

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(Continued from page 27A)

enough to "stay put" without bolting, and is equipped with an efficient foolproof V-belt drive.

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Manufacturers' PUBLICATIONS

THE DREMEL MFG. CO., 14th and Clark Sts., Racine, Wis., has issued a very colorful and interesting 24-page booklet entitled, "Carve Plastics for Fun and Profit."

It contains explicit directions for laying out, tooling, and carving 37 very interesting projects. Methods of using the various cutters, saws, emery-wheel points, sand drums, brushes, and buffing wheels that are used in this work in connection with the firm's Moto-Tool, also are described.

A nominal price has been set on this booklet.

THE SOUTH BEND LATHE WORKS, South Bend, Ind., has just issued a new catalog of the complete line of lathes manufactured by this firm. This catalog contains 112 pages with over 250 illustrations and shows 75 different sizes and types of South Bend back-geared screw-cutting lathes for production manufacturing, toolroom, school-shop, and general-shop work. A copy will be mailed on request to any individual or firm mentioning this magazine.

Sizes of lathes illustrated are 9, 11, 13, 14½, 16, and 16–24 in. swing. Each size is shown in several different models with motor drive and countershaft drive. New items shown for the first time in this catalog include a 1-in. collet-capacity precision bench lathe mounted on a welded steel bench, and a complete line of 14½-in. swing lathes.

THE LEWIS MACHINE TOOL CO., 1000 Alhambra Ave., Los Angeles, Calif., has issued a 28-page catalog describing their castings for the tool builder.

The machines covered are: milling machine, dividing centers, power hack saw, turret attachment, machine bench and drill-press vises, bench grinder, bench and floor drill presses, chain hoist, centrifugal pump, wood lathe, metal shaper, steam and gas engines, 16- and 24-in. band saws, wood shaper, 6-in. jointer, and 8-in. circular saw. Castings and blueprints for all of these projects may be obtained in the rough, or with some parts finished, from this firm.

Buyers News

THE DOUGLAS FIR PLYWOOD ASSOCIATION has recently selected D. S. Betcone, widely known construction engineer, as its midwestern field representative. Mr. Betcone will have his headquarters in Chicago and is to serve actively as a technical adviser for the varied uses of Douglas fir plywood.

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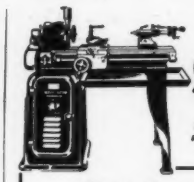

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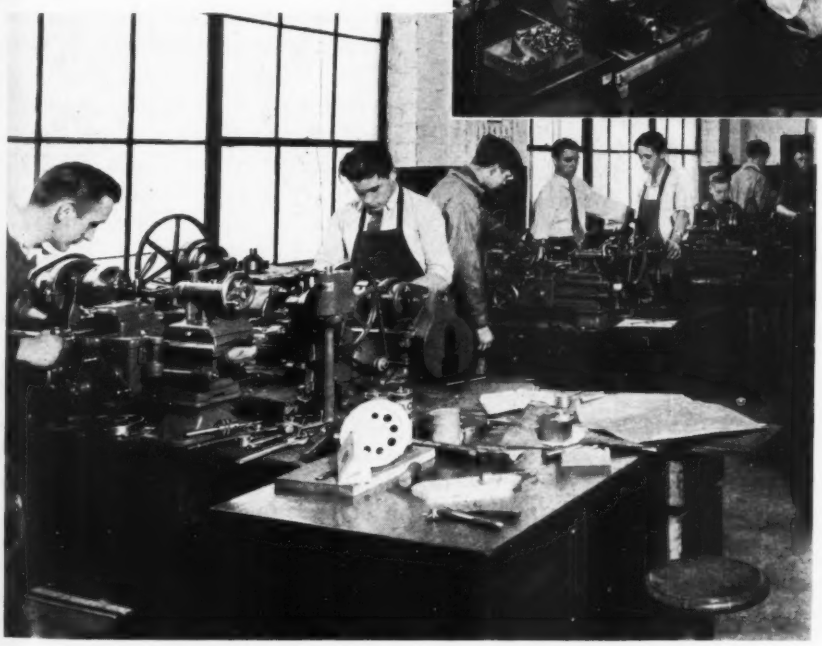

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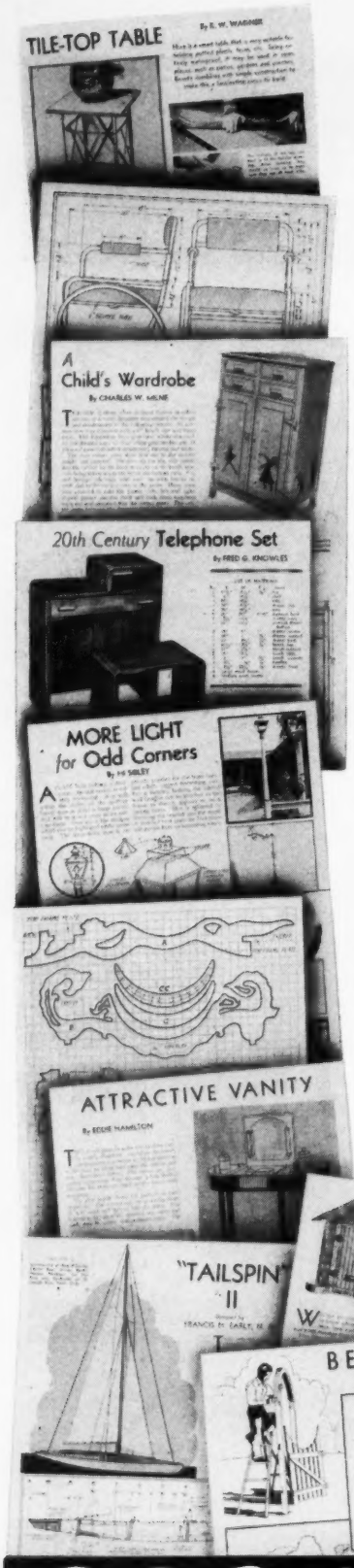

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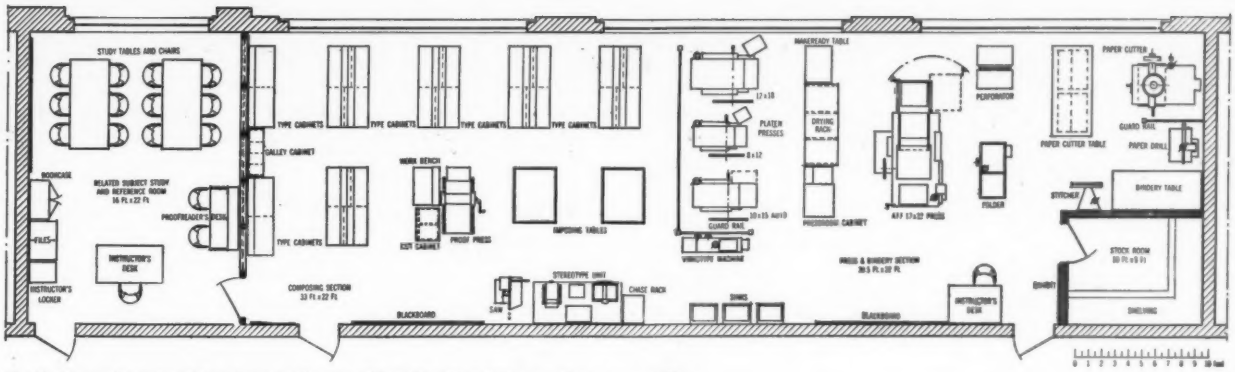


The ideal layout for trade training classes to take care of 24 to 32 students. The approximate room size, 22x72 feet. This is only one of the many School Printshop layouts ATF is prepared to furnish.

Vocational Printing Units

ATF maintains an experienced staff of engineers who will be glad to help you plan your department, advise in the selection of units best suited to your needs, help solve any difficulties in the layout or organization of your printshop. Upon request they will furnish, without cost, a layout for the ideal vocational printing unit that best suits your needs. Don't hesitate to avail yourself of this service. There is absolutely no cost or obligation. Just write

American Type Founders

Department of Education • 200 Elmora Ave., Elizabeth, N. J.

BRANCHES AND DEALERS IN TWENTY-FOUR PRINCIPAL CITIES

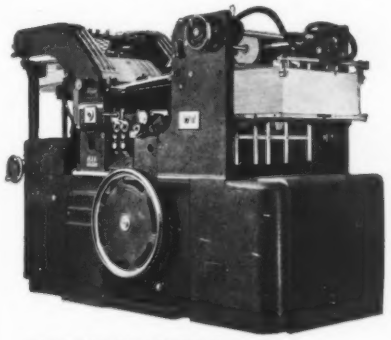
You are cordially invited to visit American Type Founders Booth (3 and 4) at the A. V. A. Convention in Grand Rapids.

Why teach printing?

Valuable information for anybody interested in teaching this worthwhile subject. Send for your copy.

ECONOMICAL MODERN EQUIPMENT

These are only a few pieces in the large assortment of vocational unit equipment we carry. Send for complete listing.

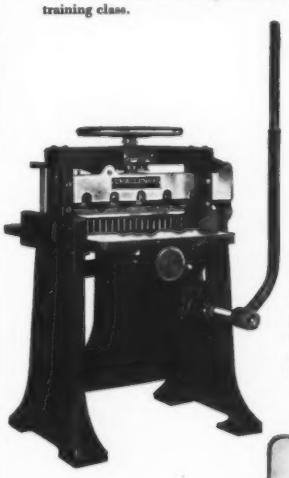


THE KELLY CLIPPER

New efficient, automatic cylinder press that takes a 13½x20 inch maximum sheet... latest addition to the distinguished Kelly line. Ideal in size for the up-to-date trade training class.

BOSTON WIRE STITCHER

Handles work up to ½ inch in thickness. Easily arranged for saddle or flat stitching. A safe, efficient machine for the average shop. Also power stitchers in all sizes for the larger units.



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Safe, easy to operate, and thoroughly dependable. The same efficient equipment used in many commercial plants all over the country. Heavy construction insures lifelong service.

DOUBLE-TIER WALL TYPE CABINET

Provides easy access to all compartments of type cases. Large working surface that takes full size working galleys. Lifetime, all steel construction.

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"Oliver"

proved by

Approval and purchase of "Oliver" Woodworking Machinery by more than 2,000 school shops, is an outstanding recognition of "Oliver" high standards of safety, utility, durability — in short, their ability for years and years of performance.

Grand Rapids, the Home of
"Oliver Machinery Company"
invites you.
A most cordial invitation is extended to directors, supervisors and shop teachers to visit our exhibit and the "Oliver" plant during the convention of the American Vocational Association.
We are especially anxious to meet all our friends, users of "Oliver" machinery, as well as those who may use them in the future.
OLIVER MACHINERY COMPANY
A. S. Kurkjian, Sales Mgr.
OLIVER

Important features responsible for "Oliver" Leadership are prominent factors in the progress and development of the woodworking departments in school shops — a development with which "Oliver" has been closely identified from the very beginning of Industrial Arts and Vocational Education.

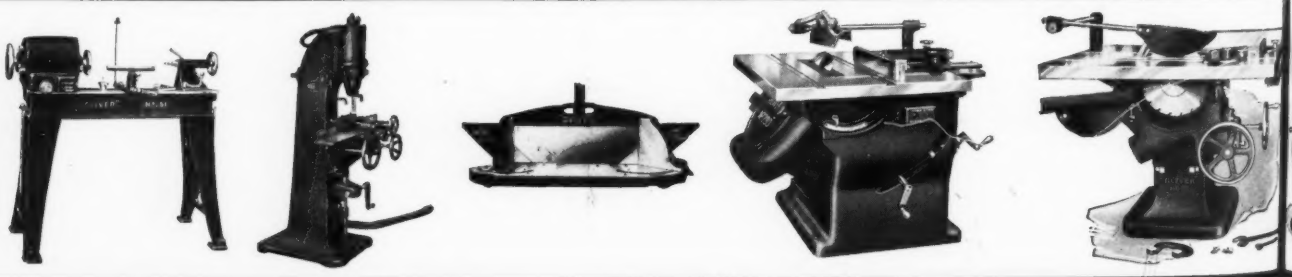
The Favorite Equipment in American School Shops

Years of satisfactory service in the woodworking industry preceding school shop acceptance and use has given "Oliver" a background of experience in providing the school shop requirements.

Special cooperation extended to school shop executives in organizing, planning and equipping woodworking shops. Inquiries and correspondence relative to requirements are solicited.

Oliver Machinery Co

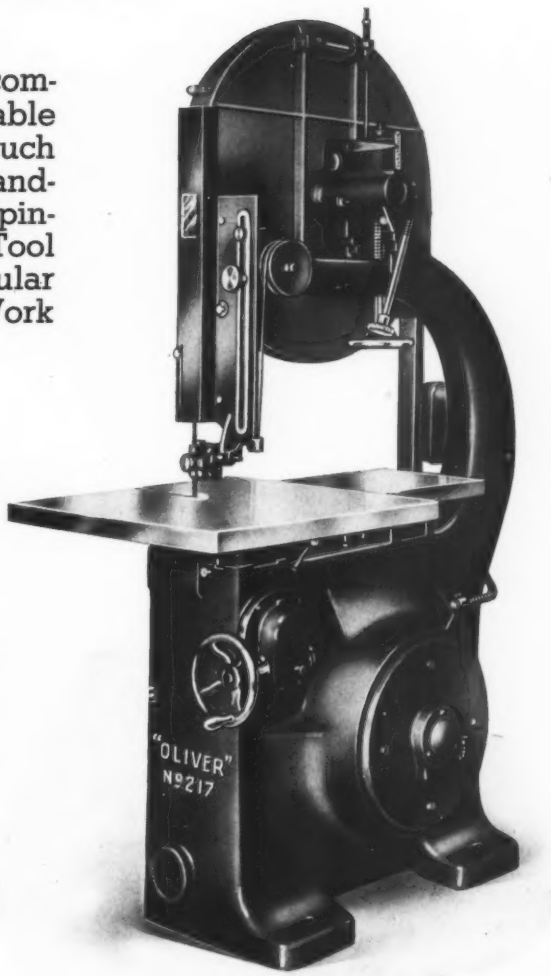
OLIVER MACHINES ARE USED IN T



Leadership

performance

The illustrations on this page are typical of the complete line of woodworking machinery now available for school shops. The "Oliver" line comprises such products as Sawing, Planing, Jointing, Turning, Sanding, Boring, Mortising, Tenoning, Shaping, and Spinning Machines; also Wood Trimmers, Oilstone Tool Grinders, Vises, Glue Pots, Band Saw Blades, Circular Saws. Saw Sharpening, Setting, and Brazing Work also solicited.



Oliver Metal-Spinning Lathe

A variety of beautiful, useful objects can be spun from many metals and supervisors and instructors should check into the opportunities and advantages offered through metal spinning instructions.

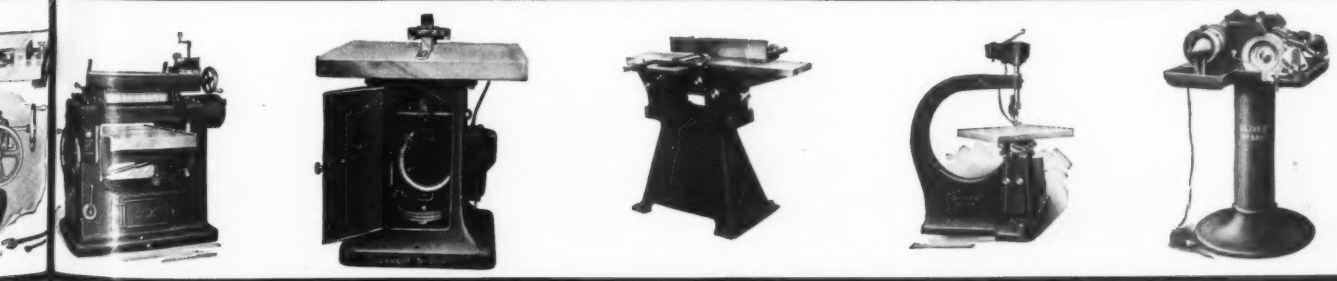
To do good metal spinning requires a good metal spinning lathe.

On the "Oliver" metal spinning lathe, beautiful, fascinating articles from many metals — Brittania metal, German silver, pewter, sheet steel, copper, bronze, brass, aluminum, etc., can be produced.

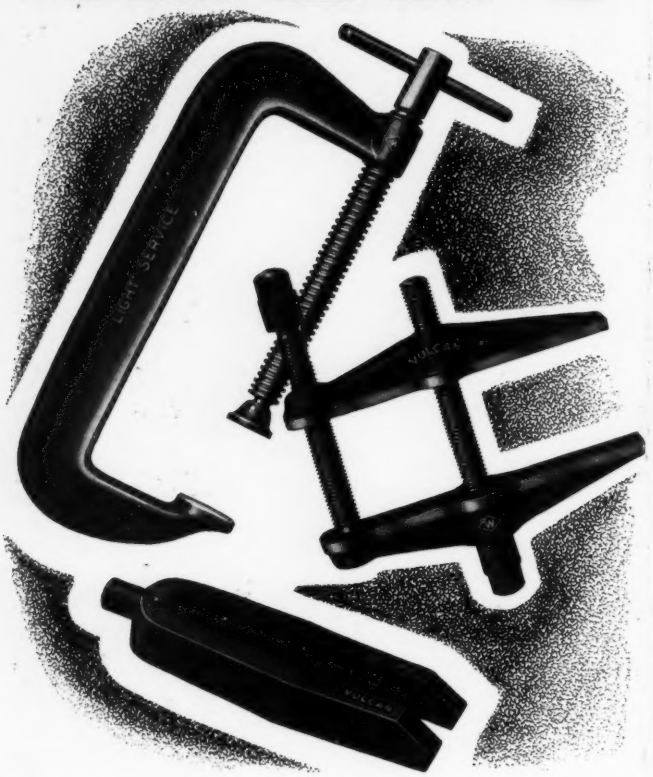
The "Oliver" Lathe has a rigid heavy bed for smooth accurate spinning. Heavy large bearings for tremendous pressures. Ball bearing motor-driven headstock, adjustable 800 to 2400 RPM. Live tail center. Also fine for wood and metal turning.

Grand Rapids, Michigan

THANDS OF SCHOOL-SHOPS EVERYWHERE



WILLIAMS' DROP-FORGED CLAMPS



The five types which comprise Williams' "C" Clamp line are the **original** models of their kind from which **all** drop-forged clamps were designed. Their appearance can be copied, but not the manufacturing methods and drop-forging experience behind them. All Williams' Clamps are heat-treated to Williams' exacting specifications. They assure you the utmost in dependable performance and long life. Made in a wide variety of sizes, 3/4 to 18" gap, for heavy, medium and light service.

Williams' Machinists' Clamps, with parallel jaws, in 4 sizes — 1 to 4" gap.

Williams' Strap Clamps are far more efficient than any makeshift device; 6 different types.

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Write for Booklet A-431, describing all these fully guaranteed tools. Your distributor can supply you.

J. H. WILLIAMS & CO., 225 Lafayette St., NewYork

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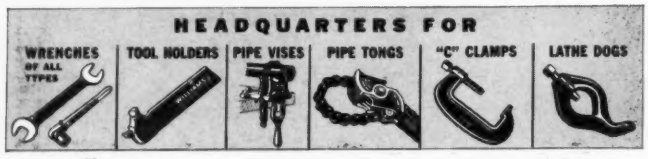
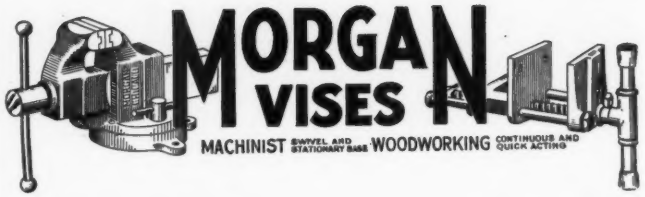
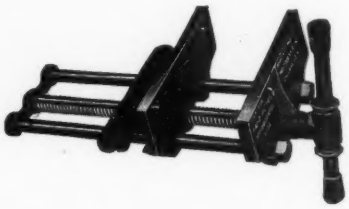


MORGAN VISES



MACHINIST SWIVEL AND STATIONARY BASE WOODWORKING CONTINUOUS AND QUICK ACTING

Morgan semi-steel vises give you more years of unbroken, satisfactory service. That is why hundreds of schools throughout the country are using Morgan vises as standard industrial-arts equipment. That is why, too, their shops are more economical and more efficient.



Morgan vises, the product of over thirty years experience in manufacturing better vises for machinists and woodworkers, are protected by an unqualified guarantee. Noted for their quick action and accurate, positive grip, they are the modern equipment for the modern shop.

It costs No More to buy the Best—Specify "Morgan."

MORGAN VISE CO.

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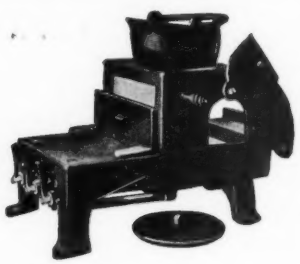
Raise Your Shop's Efficiency and Cut down Expense with Johnson's new 118 . . . . Combination Bench Furnace



HERE'S a ruggedly built, long lasting combination bench furnace that handles the largest soldering, stenciling and branding irons efficiently and easily. It helps handle the widest range of jobs faster and with better results. Removable pot holds 22 lbs. of low fusion metal, and fire-box is completely refractory lined . . . ideal for heat-treating and case hardening carbon steel tools, gears and parts. Handy side doors accommodate long rods. Three patented Johnson direct jet Bunsen Burners develop intense heat without expensive blowers or forced air blast. Write for *free* literature today!

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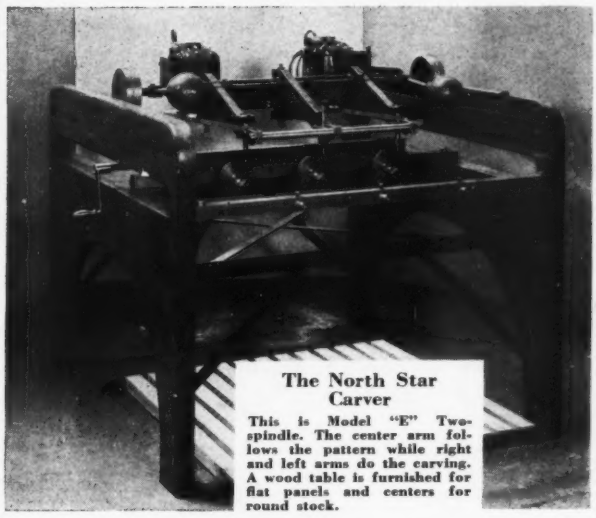

The North Star Carver

This is Model "E" Two-spindle. The center arm follows the pattern while right and left arms do the carving. A wood table is furnished for flat panels and centers for round stock.

YOU WILL FIND THE NORTH STAR CARVER A GREAT HELP in encouraging the youthful beginner. It roughs out the stock so that the student can get ahead with the more stimulating work of carving. All North Star Carvers will copy patterns accurately. They are being used for carving Novelties, Book-ends, Bowls, Plaques, Panels and Furniture Parts. They are also made with a reverse attachment which will make a left-hand carving from a right-hand pattern. Shipped complete and ready to operate. We'll be glad to send you a catalog.

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St. Paul, Minnesota

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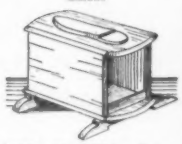
330 West 42nd Street New York

New 1940 Stanley Plan Packet

25 Prize-Winning Project Designs!

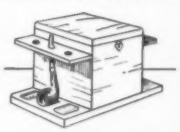
STANLEY
Trade Mark

B30—Treasure Chest



B39—Shoe Shine Box

B34—Flower Pot Holder



B44—Pipe Holder and Humidor

Thousands of industrial arts instructors have found the original Stanley Plan Packet exceptionally helpful for elementary and junior high school classes. Now Stanley is ready with 25 *new* projects, prepared by school men for school work, and available at only the cost of printing and postage.

All plans are carefully drawn in complete detail on 8½" x 11" tough paper, punched for 3-ring notebook.

Send check or money order for 50c, and your new 1940 Stanley Plan Packet will be sent to you by return mail.

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DIVISION OF THE STANLEY WORKS
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THE 1940

Shop Annual Number

of INDUSTRIAL ARTS and VOCATIONAL EDUCATION

The authoritative source of information and guidance in organizing, planning, and equipping school shops

READY . . . FEBRUARY 15, 1940

The SHOP ANNUAL NUMBER summarizes the periodic progress in the field of industrial arts and vocational education, emphasizes the new developments ahead, presents through actual shop layouts and equipment lists, the best methods of accomplishment in the school shop field. The service of the SCHOOL SHOP ANNUAL NUMBER (regular March issue) of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is

1. It renders a comprehensive service promoting the introduction, progress, and expansion of industrial arts and vocational education.

2. It provides an authoritative source of information and guidance in organizing, planning, and equipping school shops.

Single Copies $1.00—Annual Subscription, including Shop Annual Number, $2.50

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

THE BRUCE PUBLISHING COMPANY, ***Publishers***

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Try THIS one

The New Dustless TAKE-ABOUT BB10

For fast, clean work — for perfect balance — for easy, attention-less operation — for maximum safety — the New BB-10 Dustless TAKE-ABOUT Electric Sander, takes first place in vocational shops.

The powerful, high-speed, endless abrasive belt gives a smooth, "expert" finish, the kind that gives students a real thrill. The new vacuum dust pick-up system is unequalled. Add dust-free motor cooling and you have both clean work and a clean machine — always ready to do its best. Yet the use of this up-to-the-minute equipment will cost very little — TAKE-ABOUT often pays for itself from savings of time and money in school maintenance work alone.

Let us demonstrate the superiorities of the new Type BB-10 Dustless TAKE-ABOUT Sander. See phone book for name of local PORTER-CABLE Representative — or write *direct* for full details and prices NOW!

PORTABLE ELECTRIC SANDER

THE LATEST THING IN ELECTRIC SANDERS

- Powerful—High-Speed
- Efficient Dustless Operation
- Dust-Proof Mechanism
- 100% Ball Bearings Throughout

See Our A.V.A. Exhibit

PORTER-CABLE TAKE-ABOUT Sanders and other PORTER-CABLE Machines will be on display at Booth 2, A. V. A. Convention, Grand Rapids, Michigan, Dec. 6 to 9. Be sure to see this instructive exhibit.

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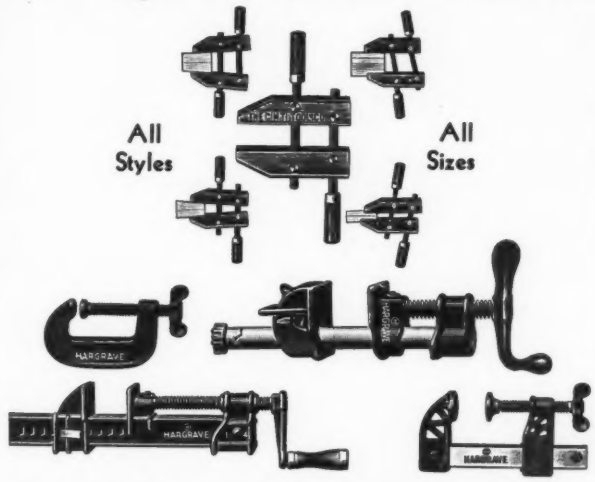


Designed and built to stand the hard every day grind of production work and improved from time to time, with the assistance of some of the largest industrial users. HARGRAVE TESTED CLAMPS have been the leaders in this field since 1879. They cost no more than ordinary clamps.

IN STOCK AT YOUR SUPPLY HOUSE.

CATALOG showing our complete line of Clamps, Chisels, Punches, Bench Anvils, Saw Vises and other tools for the SCHOOL SHOP will be mailed to you upon request.

THE CINCINNATI TOOL CO.

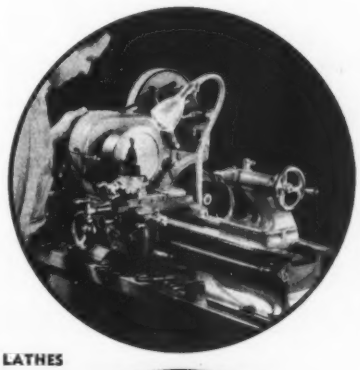
Waverly and Main Aves. Cincinnati, Ohio

To . . .

INSTRUCTORS OF INDUSTRIAL ART

You are invited to attend our special Display and Demonstration of 1940 Atlas Shop Equipment

ATLAS DEALERS OF AMERICA



LATHES

Your Atlas Dealer has ready for your inspection the finest metalworking shop equipment we have ever produced.

It's all set up—waiting for you to put it through its paces. Make it a point to visit his store soon.

DRILL PRESSES

See for yourself the new Atlas F-Series 10" Lathes. Use the automatic power cross feed (standard equipment), and make all the power and precision tests you want to.

Note the smooth performance of Atlas Drill Presses with their floating drive design. And be sure to get the facts about the economical Atlas 7" Bench Shaper.

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More and more schools in all sections of the country are standardizing on Atlas Equipment for its precision, rugged strength, and sensible low prices. See the new 1940 Atlas Machine Tools at your dealer's. Send for the Catalog for complete information on tools and accessories.

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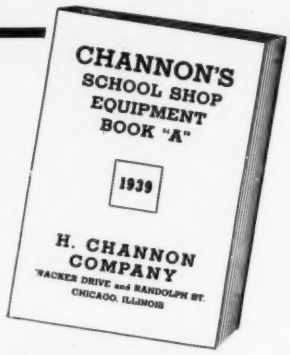
Practical Shop Equipment Book



• Illustrated shop equipment handbook. Contains valuable information for School Instructors and Executives. 104 pages. Profusely illustrated showing latest type machinery and tools for school shops.

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"Industry Buys Channon Supplies"

HEAVY-DUTY THICKNESS PLANER

IDEAL FOR SCHOOLS

The Parks Heavy Duty Planer is as dependable a woodworking machine as can be built, especially adapted to school use. Planes material up to 12" wide by 4" thick. Maximum cut 1/8". Takes pieces as short as 6" and as thin as 1/16". Has all the precision of some of the most expensive mill planers, together with a sturdiness all its own.

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Send for catalog of individual and combination machines, priced as low as $50.

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Good Woodworking Machines Since 1887

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Heavy well-ribbed cast-iron frame. Table one-piece, heavy ribbed casting. Feed rolls machined from solid bar steel. Heavy-duty ball-bearings with alemite fittings. Head and feed rolls completely guarded. Graduated scale on frame to determine depth of cut. Gibs assure accurate alignment. Special cast-iron base.

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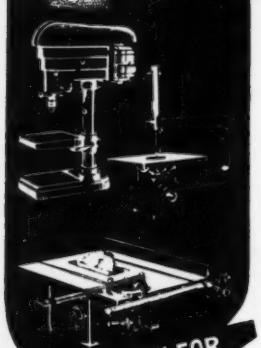

21 MODELS

New 1940 line has every widely used type in the new medium capacity so widely recommended by Industrial Arts leaders.

Saws, Drill Presses, Lathes, Band and Scroll Saws, Jointers, Sanders, Planers, Shapers, also motors and accessories.

ADVANCED DESIGN

Boice-Crane's ahead with improvements like these that really count — ingenious controls and guages that *save job setup time and get jobs done right the first try;* also new constructions methods and materials that *add yea's more life* to every machine.

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Prices? Lower than you'd expect on these better tools. Small budgets go far. And don't miss this — safety is *designed in.* Guards aren't makeshift afterthoughts.

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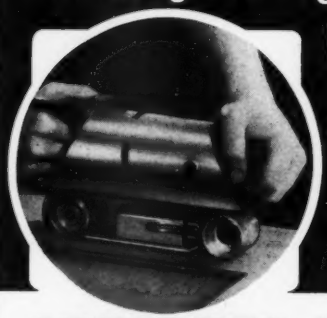

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Sands, Grinds, Polishes, Buffs, Sharpens, Removes Paint and Varnish

STUDENTS THRILL TO "MOTORIZED GRIT"

Now your students can get the tedious part of their projects done quicker and better with the GuildSander. They actually enjoy sanding—the **electric** way—instead of the hand way!

All your students can now have the use of a portable belt sander—for at the **popular price** of the GuildSander, more than one machine is an easy possibility in many vocational shops.

GuildSander is ideal for wood, wall board, metal, stone, plastics. It weighs only 9 lbs., is easy to handle in any position, has perfect balance for true, smooth sanding — and connects to any light socket either AC or DC.

You will thrill at the professional way GuildSander works. Built by sander experts. See it at your tool supply dealers — or write NOW direct for full information.

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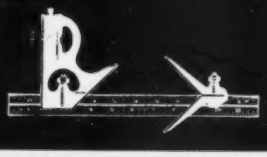
For over a half century Lufkin measuring devices have been used by machinists and engineers the world over. And when your students take their places in industry, they too will use them. So why not start them with Lufkin tools now? You'll be starting them with tools that combine unfailing accuracy with long life, ease-of-use, and a system of markings that practically eliminates errors from readings. You'll be starting them right!

Write for complete catalog 12A.



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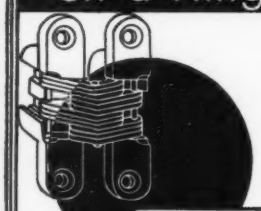
Hinge Your Unusual Designs on a Hinge designed to—

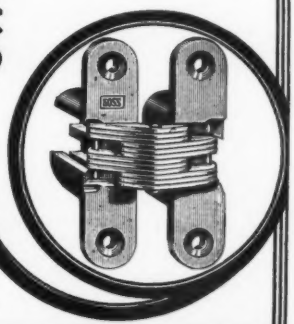


fill a need heretofore unsupplied — a hinge that does not have to be taken into consideration in any design or effect —

Be more solid or rigid than the common types.

Keep your students advised on the latest — so they may be more useful when they graduate.

SOSS IMPROVED INVISIBLE HINGES



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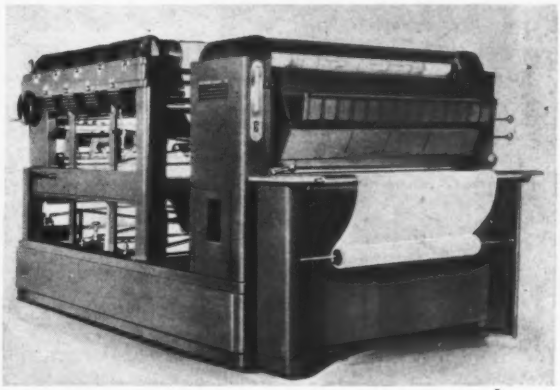

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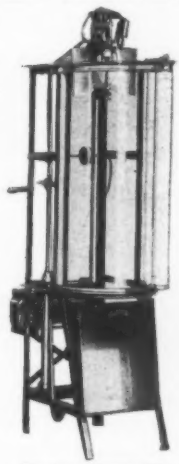

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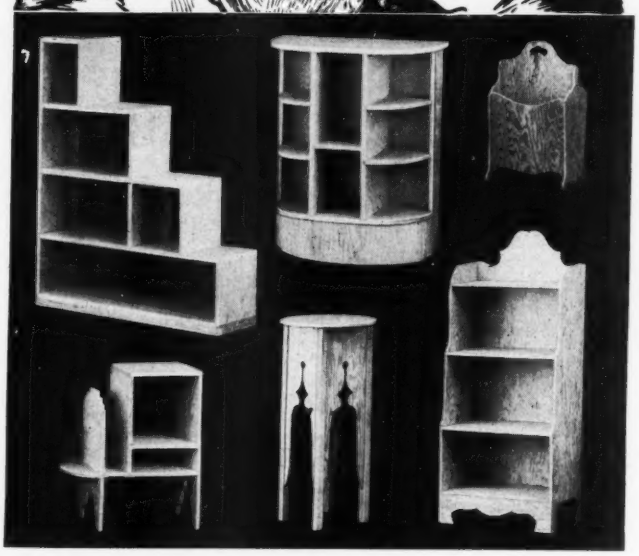

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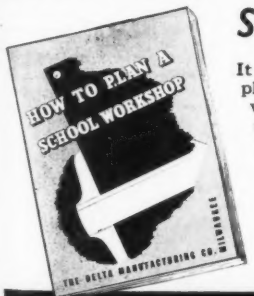

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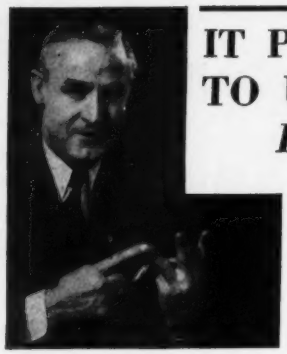

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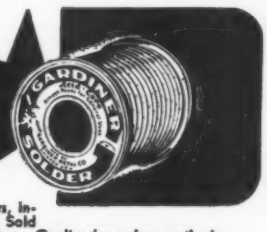

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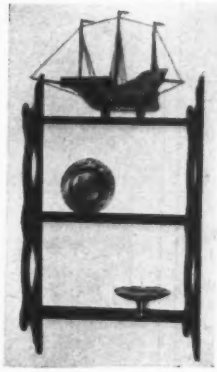

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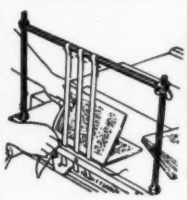

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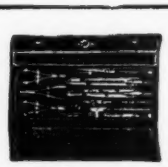

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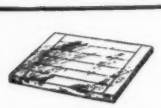

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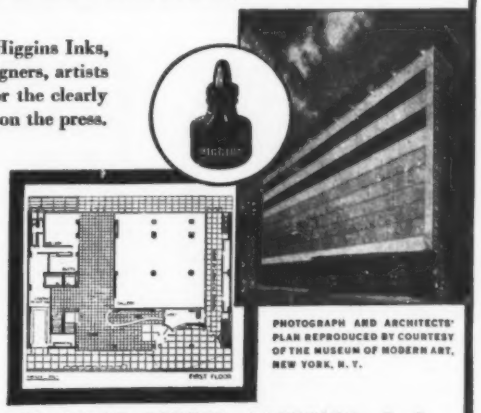

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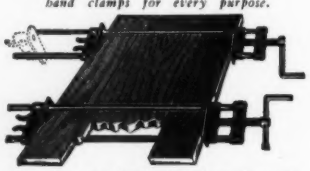

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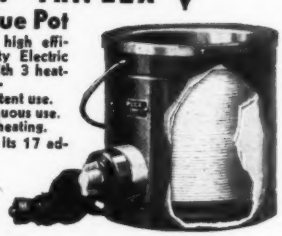

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Use the post card on this page. It will promptly bring from the manufacturers the information requested. A "keyed" alphabetical list of supplies and equipment is given for ready reference and your convenience. Insert the key number of any products in which you are interested, sign, detach, and mail the card—no postage is required if mailed in the United States.

For items of equipment or supplies not included in list please write us a special letter as we can put you in touch with all sources of supply.

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8—Ammeters
9—Anvils
10—Anvil Tools
11—Aprons, Shop
12—Arbor Presses
13—Archery Equipment and Supplies
14—Art Metal Tools
15—Asbestos Soldering Blocks
16—Auto Mechanics' Tools
17—Auto Trailer Plans and Parts
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22—Band Saws, Portable
23—Band Saw Sets
24—Bar Iron
25—Basketry Supplies
26—Battery Chargers
27—Belting
28—Benches
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30—Bench Metal
31—Bench Stones
32—Benches, Manual Training
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55—Brushes, Paint and Varnish
56—Brush Making Materials
57—Buffers, Bench, Pedestal
58—Buffs, Polishing
59—Bushing Removers
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62—Cabinets, Storage
63—Calipers
64—Cane for Chairs
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66—Casting Outfits
67—Castings, Project
68—Carved Wood Moldings
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70—Ceramics
71—Charcoal Blocks
72—Charts
73—Chasing Tools
74—Chisels
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80—Clay, Natural
81—Clock Movements
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113—Electrical Parts and Supplies
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115—Enamels
116—Engravers' Tools and Supplies
117—Envelopes
118—Exposure Meters
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120—Felt Wheels and Buffs
121—Fiber Cord
122—Files and Rasps
123—Filing Machines
124—Finishing Kits
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126—Fire Clay
127—Flasks
128—Flexible-Steel Tape Rules
129—Flexible Tubing
130—Flint Paper
131—Floor Sanders
132—Flux, Soldering
133—Forges, Gas
134—Foundry Supplies and Equipment
135—Frequency Meters
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139—Furniture Trim
140—Furniture Weaving Frames
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145—Gauges, Wire, Etc.
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148—Glue
149—Glue Pots
150—Gouges
151—Grinders and Buffers
152—Grinder Attachments
153—Grinding Compound
154—Grinding Wheels
155—Grinding Wheel Dresser
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157—Hacksaws, Power
158—Hacksaw Blades
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170—Jointers, Hand
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172—Kits, Metal Projects
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216—Pens, Lettering
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219—Phase Angle Meters
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247—Sanding, Discs
248—Sandpaper
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250—Saw Filing Machines
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254—Saws, Portable Electric
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257—Screw Drivers
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